



# MATHS

## BOOKS - KC SINHA ENGLISH

### DEFINITE INTEGRALS - FOR BOARDS

#### Solved Examples

1. Find  $\int_0^1 (4x^3 + 3x^2 - 2x + 1) dx$



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2. Evaluate:  $\int_0^{\pi/4} \sqrt{1 + \sin 2x} dx$  (ii)

$$\int_0^{\pi/4} \sqrt{1 - \sin 2x} dx$$



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3. Evaluate:  $\int_0^{\pi/2} \cos^3 x dx$



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4. Evaluate:  $\int_0^{\pi/2} \sin^4 x dx$





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5. Find  $\int_0^{\frac{\pi}{2}} \frac{dx}{1 + \sin x}$



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6. Find  $\int_0^1 \frac{dx}{\sqrt{x+1} + \sqrt{x}}$



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7. Evaluate  $\int_0^{\sqrt{2}} \sqrt{2-x^2} dx$



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8. Evaluate:  $\int_0^4 \frac{1}{\sqrt{x^2 + 2x + 3}} dx$



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9. Evaluate:  $\int_0^{\pi/2} \frac{\cos x}{1 + \cos x + \sin x} dx$



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10. If  $\int_0^a \sqrt{x} dx = 2a \int_0^{\pi/2} \sin^3 x dx$  find the value of integral  $\int_a^{a+1} x dx$ .



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11. Find the value of  $\int_0^{\pi/2} \frac{\cos x}{(1 + \sin x)^2} dx$



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12. Find  $\int_0^a \sqrt{a^2 - x^2} dx$





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13. The value of the integral  $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$  is (a)  $\frac{\pi}{2} + 1$  (b)  $\frac{\pi}{2} - 1$  (c)  $-1$  (d)  $1$



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14. Evaluate the following integral:

$$\int_{1/3}^1 \frac{(x - x^3)^{1/3}}{x^4} dx$$



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15. Evaluate  $\int_1^e \frac{\cos(\log_e x)}{x} dx$

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16. The value of the integral

$$\int_{\alpha}^{\beta} \frac{1}{\sqrt{(x - \alpha)(\beta - x)}} dx$$

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17. Evaluate:  $\int_0^{1/2} \frac{\sin^{-1} x}{(1 - x^2)^{3/2}} dx$

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18. Evaluate the integrals

$$\int_0^1 \sin^{-1} \left( \frac{2x}{1+x^2} \right) dx$$



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19. Prove that  $\int_0^{\frac{\pi}{4}} 2 \tan^3 x dx = 1 - \log 2$



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20. Evaluate the definite integrals

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$$



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21. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$$



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22. Evaluate:  $\int_0^{\frac{\pi}{2}} \frac{\sin 2x}{\sin^4 x + \cos^4 x} dx$



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23. Evaluate the following integral:

$$\int_0^{\pi/2} \frac{1}{2\cos x + 4\sin x} dx$$



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24. Find  $\int_0^{\pi} x \sin^2 x dx$



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25. Evaluate:

$$\int_0^{\frac{\pi}{2}} (\sin 2x \tan^{-1}(\sin x)) dx$$



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26. Evaluate:  $\int x \frac{e^x}{(x+1)^2} dx$



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27. Evaluate  $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} e^x \left( \frac{1 + \sin x}{1 + \cos x} \right) dx$



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## Exercise

1. Evaluate  $\int_0^{\pi/2} \frac{\cos x}{(1 + \sin x)(2 + \sin x)} dx.$

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2. Find the value of the following:

$$\int_{-1}^1 (x + 1) dx$$

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3. Evaluate the definite integrals

$$\int 12(4x^3 - 5x^2 + 6x + 9) dx$$



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4. Find the value of the following:  $\int_0^1 \frac{dx}{1+x^2}$



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5. Find the value of the following:

$$\int_0^1 \frac{dx}{\sqrt{1-x^2}}$$



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6. Find the value of the following:  $\int_4^5 e^x dx$



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7. Find the value of the following:  $\int_0^{\frac{\pi}{4}} \tan x dx$



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8. Find the value of the following:

$$\int_0^{\frac{2}{3}} \frac{dx}{4 + 9x^2}$$



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9. Evaluate the following definite integral:

$$\int_{-1}^1 \frac{1}{x^2 + 2x + 5} dx$$



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10. Find the value of the following:

$$\int_0^{\frac{\pi}{4}} \frac{1 + \sin 2x}{\cos x + \sin x} dx$$



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11. Evaluate:  $\int \cos^3 3x dx$



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12. Find the value of the following:

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cos e c^2 \theta \cos \theta d\theta$$







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13. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{2}} \cos 2x dx$$



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14. Evaluate  $\int_0^{\pi/4} \frac{dx}{1 + \cos 2x}$



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15. Find the value of the following:

$$\int_0^{\frac{\pi}{2}} \sqrt{1 + \cos x} dx$$



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16. Find the value of the following:

$$\int_0^{\frac{\pi}{4}} \frac{dx}{1 - \sin x}$$



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17. Find the value of the following:

$$\int_0^{\frac{\pi}{2}} \sqrt{1 + \cos x} dx$$



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18. 
$$\int_{-1}^0 \frac{dx}{\sqrt{3x+4} - \sqrt{3x+9}}$$



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19. 
$$\int_0^{\frac{\pi}{2}} (1 + \sin x)^3 \cos x dx$$



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$$20. \int_0^{\frac{\pi}{2}} (a + b \sin \theta)^3 \cos \theta d\theta$$



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$$21. \int_0^{\frac{\pi}{2}} \frac{\cos x}{1 + \sin x} dx$$



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22. Evaluate the following integral:

$$\int_0^{\pi/4} \sin^3 2t \cos 2t dt$$



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23.  $\int_0^{\frac{\pi}{2}} \sqrt{\sin \theta} \cos^5 \theta d\theta$



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24.  $\int_0^{\frac{\pi}{3}} \frac{\sec x \tan x}{1 + \sec^2 x} dx$



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$$25. \int_0^{\frac{\pi}{2}} \frac{\cos x}{\sqrt{1 + \sin x}} dx$$



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$$26. \int_0^{\frac{\pi}{2}} \sqrt{\cos x} \sin x dx$$



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$$27. \int_0^{\frac{\pi}{2}} \cos^5 x dx$$



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$$28. \int_0^{\frac{\pi}{2}} \sin^2 x \cos^2 x dx$$



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$$29. \int_0^{\frac{\pi}{4}} \tan^3 x \sec^2 x dx$$



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$$30. \int_0^{\frac{\pi}{4}} \sec^4 x dx$$



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$$31. \int_0^{\frac{\pi}{4}} \tan^3 x dx$$



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$$32. \int_0^{\frac{\pi}{4}} (\tan x - x) \tan^2 x dx$$



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$$33. \int_0^{\pi} \frac{\tan x}{\sin x + \tan x} dx$$





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34. Evaluate the definite integrals

$$\int_0^1 \frac{dx}{\sqrt{1-x^2}}$$



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35.  $\int_0^2 x\sqrt{x+2}dx$



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36. Evaluate :  $\int_2^3 \frac{x}{x^2 + 1} dx$



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37. Evaluate :  $\int_1^2 \frac{5x^2}{x^2 + 4x + 3} dx$



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38.  $\int_0^1 (2x^2 - 3)^n x dx$



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39.  $\int_0^1 x^3 \sqrt{1 + 3x^4} dx$



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40.  $\int_{\frac{1}{2}}^1 \frac{dx}{x^2 \sqrt{1 - x^2}}$



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41. Evaluate  $\int_0^1 \frac{\tan^{-1} x}{1 + x^2} dx$



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$$42. \int_0^{\frac{1}{2}} \frac{e^{\sin^{-1} x}}{\sqrt{1-x^2}} dx$$



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$$43. \int_0^{\pi} x \cos^2 x dx$$



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$$44. \int_0^{\frac{\pi}{2}} x \sin x \sin 2x dx$$



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45. Evaluate :  $\int_0^{\frac{\pi}{2}} x^2 \sin x dx$



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46.  $\int_1^{\sqrt{e}} x \log x dx$



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47.  $\int_0^1 \tan^{-1} x dx$



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48.  $\int_0^1 x^2 e^x dx$



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49.  $\int_0^{\frac{\pi}{2}} e^{-x} \cos x dx$



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50.  $\int_a^b \frac{\log x}{x^2} dx$



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51.  $\int_0^a \left( \sqrt{a^2 - x^2} + xe^x \right) dx$



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52. Evaluate:  $\int_1^2 \frac{1}{(x+1)(x+2)} dx$  (ii)

$$\int_1^2 \frac{1}{x(1+x^2)} dx$$



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