

APOLLO

# Integration-I

## FBISE Mathematics Class 12 (HSSC-II)

Domain A: Numbers and Algebra

26 questions | questions

Original FBISE question crops. National Curriculum 2022-23 topic.

**Q1. Fill the relevant bubble against each question. Each part carries ONE mark.**

| Sr No. | Question                                                                           | A                    | B                     | C                     | D                     |
|--------|------------------------------------------------------------------------------------|----------------------|-----------------------|-----------------------|-----------------------|
| i.     | The inverse of $f(x) = \frac{x-1}{2}$ is:                                          | $2x-1$               | $2x+1$                | $x-2$                 | $x+2$                 |
| ii.    | For what value of $x$ , $f(x) = \frac{x-2}{x^2-4}$ is discontinuous?               | $-2$                 | $-1$                  | $1$                   | <b>0</b>              |
| iii.   | What is the derivative of $\left(\frac{\sin \alpha}{\sec x}\right)$ w. r. t. $x$ ? | $\sin \alpha \sin x$ | $-\cos \alpha \cos x$ | $-\sin \alpha \sin x$ | $-\cos x \sin \alpha$ |
| iv.    | If $y = \sin x$ , then what is the value of $y_4$ ?                                | $\sin x$             | $\cos x$              | $-\sin x$             | $-\cos x$             |
| v.     | The absolute maximum value of $f(x) = -x^2 + 3x - 2$ over $[1, 3]$ is:             | $\frac{3}{2}$        | $\frac{1}{4}$         | $3$                   | $-2$                  |

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| i.     | The inverse of $f(x) = \frac{x-1}{2}$ is:                                          | $2x-1$                    | $2x+1$                   | $x-2$                     | $x+2$                                             |
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| iii.   | What is the derivative of $\left(\frac{\sin \alpha}{\sec x}\right)$ w. r. t. $x$ ? | $\sin \alpha \sin x$      | $-\cos \alpha \cos x$    | $-\sin \alpha \sin x$     | $-\cos x \sin \alpha$                             |
| iv.    | If $y = \sin x$ , then what is the value of $y_4$ ?                                | $\sin x$                  | $\cos x$                 | $-\sin x$                 | $-\cos x$                                         |
| v.     | The absolute maximum value of $f(x) = -x^2 + 3x - 2$ over $[1, 3]$ is:             | $\frac{3}{2}$             | $\frac{1}{4}$            | $3$                       | $-2$                                              |
| vi.    | What is the integrated value of $(3x+1)^5$ w.r.t. $x$ ?                            | $\frac{(3x+1)^6}{18} + C$ | $\frac{(3x+1)^6}{6} + C$ | $\frac{3(3x+1)^6}{6} + C$ | $\frac{\left(\frac{3x^2}{2} + x\right)^6}{2} + C$ |

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| i.     | The inverse of $f(x) = \frac{x-1}{2}$ is:                                          | $2x-1$                    | $2x+1$                   | $x-2$                                              | $x+2$                                             |
| ii.    | For what value of $x$ , $f(x) = \frac{x-2}{x^2-4}$ is discontinuous?               | $-2$                      | $-1$                     | $1$                                                | <b>0</b>                                          |
| iii.   | What is the derivative of $\left(\frac{\sin \alpha}{\sec x}\right)$ w. r. t. $x$ ? | $\sin \alpha \sin x$      | $-\cos \alpha \cos x$    | $-\sin \alpha \sin x$                              | $-\cos x \sin \alpha$                             |
| iv.    | If $y = \sin x$ , then what is the value of $y_4$ ?                                | $\sin x$                  | $\cos x$                 | $-\sin x$                                          | $-\cos x$                                         |
| v.     | The absolute maximum value of $f(x) = -x^2 + 3x - 2$ over $[1, 3]$ is:             | $\frac{3}{2}$             | $\frac{1}{4}$            | $3$                                                | $-2$                                              |
| vi.    | What is the integrated value of $(3x+1)^5$ w.r.t. $x$ ?                            | $\frac{(3x+1)^6}{18} + C$ | $\frac{(3x+1)^6}{6} + C$ | $\frac{3(3x+1)^6}{6} + C$                          | $\frac{\left(\frac{3x^2}{2} + x\right)^6}{2} + C$ |
| vii.   | What evaluates $\int_{-a}^a (x^3 + x) dx$ ?                                        | $2 \int_0^a (x^3 + x) dx$ | $0$                      | $\int_{-a}^0 (x^3 + x) dx - \int_0^a (x^3 + x) dx$ | $\int_0^a (x^3 + x) dx$                           |

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| i.     | The inverse of $f(x) = \frac{x-1}{2}$ is:                                          | $2x-1$                    | $2x+1$                   | $x-2$                                              | $x+2$                                       |
| ii.    | For what value of $x$ , $f(x) = \frac{x-2}{x^2-4}$ is discontinuous?               | $-2$                      | $-1$                     | $1$                                                | <b>0</b>                                    |
| iii.   | What is the derivative of $\left(\frac{\sin \alpha}{\sec x}\right)$ w. r. t. $x$ ? | $\sin \alpha \sin x$      | $-\cos \alpha \cos x$    | $-\sin \alpha \sin x$                              | $-\cos x \sin \alpha$                       |
| iv.    | If $y = \sin x$ , then what is the value of $y_4$ ?                                | $\sin x$                  | $\cos x$                 | $-\sin x$                                          | $-\cos x$                                   |
| v.     | The absolute maximum value of $f(x) = -x^2 + 3x - 2$ over $[1, 3]$ is:             | $\frac{3}{2}$             | $\frac{1}{4}$            | $3$                                                | $-2$                                        |
| vi.    | What is the integrated value of $(3x+1)^5$ w.r.t. $x$ ?                            | $\frac{(3x+1)^6}{18} + C$ | $\frac{(3x+1)^6}{6} + C$ | $\frac{3(3x+1)^6}{6} + C$                          | $\frac{\left(\frac{3x^2}{2} + x\right)}{2}$ |
| vii.   | What evaluates $\int_{-a}^a (x^3 + x) dx$ ?                                        | $2 \int_0^a (x^3 + x) dx$ | $0$                      | $\int_{-a}^0 (x^3 + x) dx - \int_0^a (x^3 + x) dx$ | $\int_0^a (x^3 + x) dx$                     |
| viii.  | If $\int_2^4 f(x) dx = 6$ , then what results $\int_2^4 [f(x) + 3] dx$ ?           | $12$                      | $3$                      | $6$                                                | $9$                                         |

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| ix. | The region bounded by $y = x^2$ and $y = x + 2$ is revolved around x-axis. Calculate the volume of a solid formed by the revolution of this region. | 4 |
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| Find the area of the region enclosed between the curves $y = 4 - x^2$ and $y = x^2$ . | 4 |
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| xi. | Estimate the value of the integral<br>$I = \int_0^{\pi} \sin(x) dx$ , using the trapezium rule<br>with 4 subintervals. Round your answer to<br>4 decimal places. | 4 |
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| Evaluate: $\int (3t + 1)(t - 1) dt$ | 04 |
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|    |                                                                                   |    |
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| OR | Find the area under the graph of $f(x) = 3x^2 - 2x$ over<br>the interval $[1, 3]$ | 04 |
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| (v) | Evaluate: $\int (2z - 3)(z + 2) dz$ | 04 |
|-----|-------------------------------------|----|

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| OR | Find the area under the graph of $f(x) = 6x^2 + 4x$ over<br>the interval $[1, 3]$ | 04 |
|----|-----------------------------------------------------------------------------------|----|

|    |                                                                           |    |
|----|---------------------------------------------------------------------------|----|
| OR | Find area between $y = x^2 - 3x$ and $x$ -axis from<br>$x = 0$ to $x = 4$ | 04 |
|----|---------------------------------------------------------------------------|----|

|    |                                                                          |    |
|----|--------------------------------------------------------------------------|----|
| OR | Approximate $\int_0^1 (1 + x) dx$ using Simpson's rule with<br>$n = 2$ . | 04 |
|----|--------------------------------------------------------------------------|----|

|  |                                                                                                             |    |
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|  | Find the area bounded by the curve<br>$y = x^2 + 2$ , the $x$ -axis, and the lines $x = 1$ and<br>$x = 3$ . | 04 |
|--|-------------------------------------------------------------------------------------------------------------|----|

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|  | Find area of the region bounded by the curves<br>$y = x^2$ and $y = 4x - x^2$ . | 04 |
|--|---------------------------------------------------------------------------------|----|

|      |                                                                      |    |    |                                                                                           |    |
|------|----------------------------------------------------------------------|----|----|-------------------------------------------------------------------------------------------|----|
| (ii) | Evaluate the indefinite integral $\int (1 + \sqrt{x})^2 dx, (x > 0)$ | 04 | OR | Find a vertex whose magnitude is 4 and is parallel to<br>$2\hat{i} - 3\hat{j} + 6\hat{k}$ | 04 |
|------|----------------------------------------------------------------------|----|----|-------------------------------------------------------------------------------------------|----|

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| (v) | Evaluate $\int \frac{dx}{\sqrt{x+1}-\sqrt{x}}$ | 04 |
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| Find the area between the $x$ -axis and the curve $y = 4x - x^2$ | 04 |
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|       |                                                       |    |
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| (xii) | Evaluate the definite integral $\int_{-1}^5  x-3  dx$ | 04 |
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|                            |              |           |               |                     |
|----------------------------|--------------|-----------|---------------|---------------------|
| derivative $f''(x)$ is:    |              |           |               |                     |
| 3. $\int \frac{1}{x} dx =$ | $\ln x  + C$ | $e^x + C$ | $x \ln x + C$ | $\frac{x^2}{2} + C$ |

|                                  |               |   |               |   |
|----------------------------------|---------------|---|---------------|---|
| What results $\int_0^1 x^2 dx$ ? | $\frac{1}{3}$ | 1 | $\frac{1}{2}$ | 0 |
|----------------------------------|---------------|---|---------------|---|

|                                                                                                                               |
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| and $f'''(x)$<br>Find the total area bounded by $y = x^3 - 4x$ , the $x$ -axis, and the vertical lines $x = -2$ and $x = 2$ . |
|-------------------------------------------------------------------------------------------------------------------------------|

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|-----|-------------------------------------------------------------------------------------------------|-------------------------|---------------|-------|----------------------------|
| ix. | For what value of $k$ , the integral $\int_1^k x^{n-1} dx = \frac{1}{n}$ ? ; $n \in \mathbb{Z}$ | $\sqrt[n]{\frac{2}{n}}$ | $\sqrt[n]{2}$ | $2^n$ | $\sqrt[n]{\frac{2n-1}{n}}$ |
|-----|-------------------------------------------------------------------------------------------------|-------------------------|---------------|-------|----------------------------|

|    |                                                               |    |   |   |   |
|----|---------------------------------------------------------------|----|---|---|---|
| x. | What is the evaluated value of $\int_0^{2\pi} \sin x \, dx$ ? | -2 | 0 | 2 | 4 |
|----|---------------------------------------------------------------|----|---|---|---|

|     |                                                                                                                      |      |      |      |      |
|-----|----------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| xx. | If $f(0) = 1, f(1) = 2.72$ then, what is the approximated value of $\int_0^1 f(x) dx$ by using the trapezoidal rule? | 1.86 | 1.88 | 1.87 | 1.72 |
|-----|----------------------------------------------------------------------------------------------------------------------|------|------|------|------|

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| ii. | Find the area under the graph of<br>$f(x) = x^3 - x$ over the interval $[-1, 1]$ | 4 |
|-----|----------------------------------------------------------------------------------|---|