

Integration Objective Questions

1. Find the largest value of k for which $\int_0^k 8x \, dx = 1$.

- A. $\frac{1}{8}$
- B. $\frac{1}{4}$
- C. $\frac{1}{\sqrt{8}}$
- D. $\frac{1}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	2.2	C	0.4	0.81	NC	C12, C15	HSN 069

$$\int_0^k 8x \, dx = 1$$
$$\left[\frac{8x^2}{2} \right]_0^k = 1$$
$$4k^2 = 1$$
$$k^2 = \frac{1}{4}$$
$$k = \pm \frac{1}{2}.$$

Option D

2. Find the largest value of k for which $\int_0^k (2x - 3) dx = 4$.

- A. 1
- B. 2
- C. 4
- D. 7

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	2.2	C	0.69	0.48	NC	C12, C15	HSN 18

$$\int_0^k (2x - 3) dx = \left[\frac{2x^2}{2} - 3x \right]_0^k = k^2 - 3k.$$

$$k^2 - 3k = 4$$

$$k^2 - 3k - 4 = 0$$

$$(k+1)(k-4) = 0$$

$$k = -1 \text{ or } k = 4$$

Option C

3. What is the value of $\int_0^1 x^{3/2} dx$?

- A. $\frac{2}{5}$
- B. $\frac{1}{2}$
- C. $\frac{3}{2}$
- D. $\frac{5}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.2	C	0.38	0.65	NC	C13	HSN 163

$$\int_0^1 x^{3/2} dx = \left[\frac{x^{5/2}}{5/2} \right]_0^1 = \frac{2}{5}.$$

Option A

4. What is the value of $\int_0^1 x^{\frac{1}{2}} dx$?

- A. $\frac{1}{2}$
- B. $\frac{2}{3}$
- C. 1
- D. $\frac{3}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.2	C	0.5	0.46	NC	C13, C15	HSN 144

$$\int_0^1 x^{\frac{1}{2}} dx = \left[\frac{x^{\frac{3}{2}}}{\frac{3}{2}} \right]_0^1 = \frac{2}{3} (1)^{\frac{3}{2}} = \frac{2}{3}. \quad \text{Option } \boxed{B}$$

5. What is the value of $\int_1^3 (x^2 - 4x + 3) dx$?

- A. $-\frac{4}{3}$
- B. 0
- C. $\frac{2}{3}$
- D. 4

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.2	C	0.68	0.38	NC	C15, C12	HSN 153

$$\begin{aligned} \int_1^3 (x^2 - 4x + 3) dx &= \left[\frac{x^3}{3} - \frac{4x^2}{2} + 3x \right]_1^3 \\ &= \frac{27}{3} - 18 + 9 - \left(\frac{1}{3} - 2 + 3 \right) \\ &= 9 - 9 - 1 - \frac{1}{3} \\ &= -\frac{4}{3} \quad \text{Option } \boxed{A} \end{aligned}$$

6. What is the value of $\int_0^3 (4x^2 + 3) dx$?

- A. 24
- B. 36
- C. 39
- D. 45

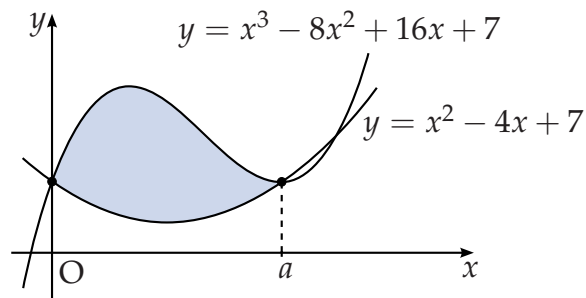
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Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	2.2	C	0.47	0.71	NC	C15, C12	HSN 164

$$\begin{aligned}\int_0^3 (4x^2 + 3) dx &= \left[\frac{4}{3}x^3 + 3x \right]_0^3 \\ &= \frac{4}{3} \times 3^3 + 3 \times 3 \\ &= 4 \times 3^2 + 3^2 \\ &= 45.\end{aligned}$$

Option D

7. The diagram shows the area bounded by the curves $y = x^3 - 8x^2 + 16x + 7$ and $y = x^2 - 4x + 7$ between $x = 0$ and $x = a$.



Which of the following gives the value of the shaded area?

- A. $\int_0^a (x^3 - 9x^2 + 20x) dx$
 B. $\int_0^a (x^3 - 9x^2 + 12x + 14) dx$
 C. $\int_0^a (-x^3 + 9x^2 - 20x) dx$
 D. $\int_0^a (x^3 - 7x^2 + 12x + 14) dx$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.2	C	0.47	0.7	CN	C17	HSN 156

$$\begin{aligned}
 & \int_0^a (\text{upper curve} - \text{lower curve}) dx \\
 &= \int_0^a (x^3 - 8x^2 + 16x + 7 - (x^2 - 4x + 7)) dx \\
 &= \int_0^a (x^3 - 9x^2 + 20x) dx. \qquad \text{Option } \boxed{A}
 \end{aligned}$$

8. What is the value of $\int_0^{\pi} \sin x \, dx$?

- A. -2
- B. 0
- C. 1
- D. 2

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	3.2	C	0.32	0.32	NC	C23, C15	HSN 165

$$\int_0^{\pi} \sin x \, dx = [-\cos x]_0^{\pi} = -\cos \pi + \cos 0 = 1 + 1 = 2.$$

Option D

[END OF QUESTIONS]