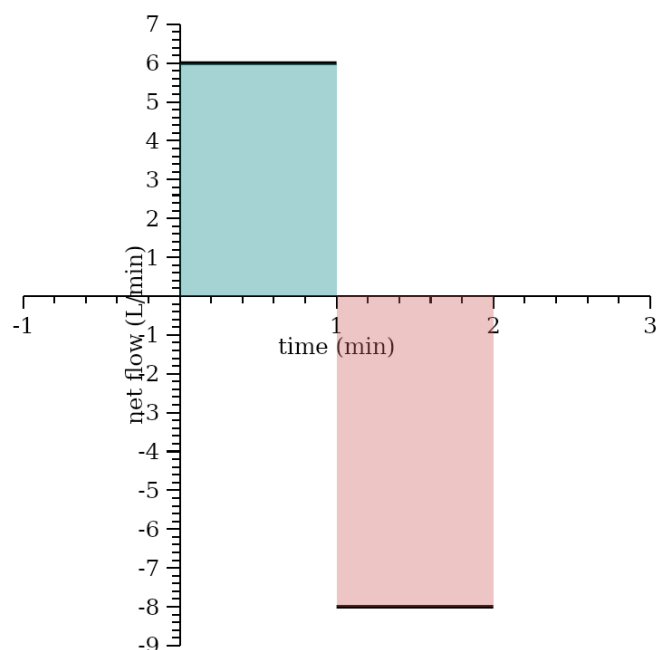




Applications of Integration

- 1 The graph shows net water flow $r(t)$ in L/min. Which setup gives the tank's net change over the shown interval?



A
$$\int_0^1 r(t) dt = 1 \cdot 6$$

B
$$\int_2^0 r(t) dt = 1 \cdot 6 + 1 \cdot (-8)$$

C
$$\int_0^2 |r(t)| dt = 1 \cdot 6 + 1 \cdot (8)$$

D
$$\int_0^2 r(t) dt = 1 \cdot 6 + 1 \cdot (-8)$$

- 2 A tank receives 5 L/min for 1 min, then drains 6 L/min for 1 min. Which setup gives the net change in its water volume?

A
$$\int_1^2 (-6) dt$$

B
$$\int_1^0 5 dt + \int_2^1 (-6) dt$$

C
$$\int_0^1 5 dt + \int_1^2 6 dt$$

D
$$\int_0^1 5 dt + \int_1^2 (-6) dt$$

- 3 Water flows into a tank at $r(t)=6$ L/min for $0 \leq t < 1$ and at $r(t)=-10$ L/min for $1 \leq t \leq 2$. What is the net change in volume over $0 \leq t \leq 2$?

A 16 L

B 4 L

C -10 L

D -4 L

- 4 A tank starts with 21 L. Its rate $r(t)$ is 3 L/min on $0 \leq t < 1$ and -4 L/min on $1 \leq t \leq 2$. How much water remains at $t=2$?

A 22 L

B 20 L

C 28 L

D -1 L

- 5 A vehicle travels at 3 m/s for 1 s, then at 4 m/s in the opposite direction for 1 s. Which setup gives its signed displacement?

A
$$\int_0^1 3 dt$$

B
$$\int_1^0 3 dt + \int_2^1 (-4) dt$$

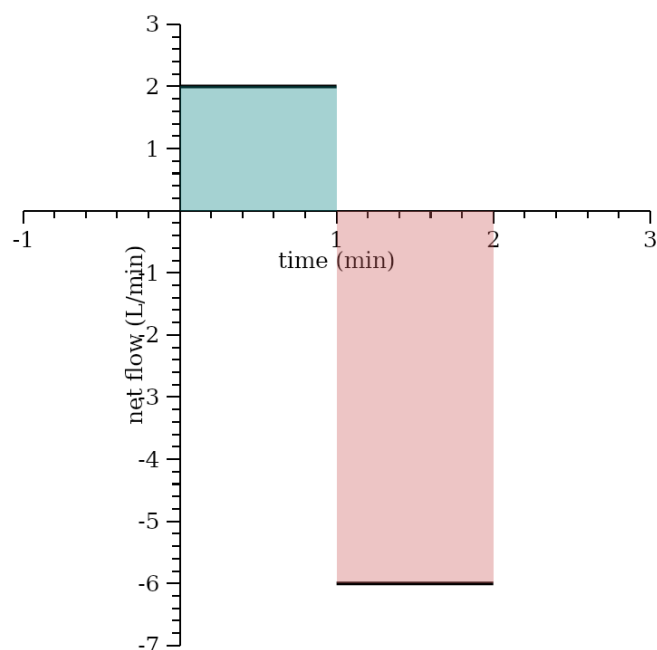
C
$$\int_0^1 3 dt + \int_1^2 4 dt$$

D
$$\int_0^1 3 dt + \int_1^2 (-4) dt$$



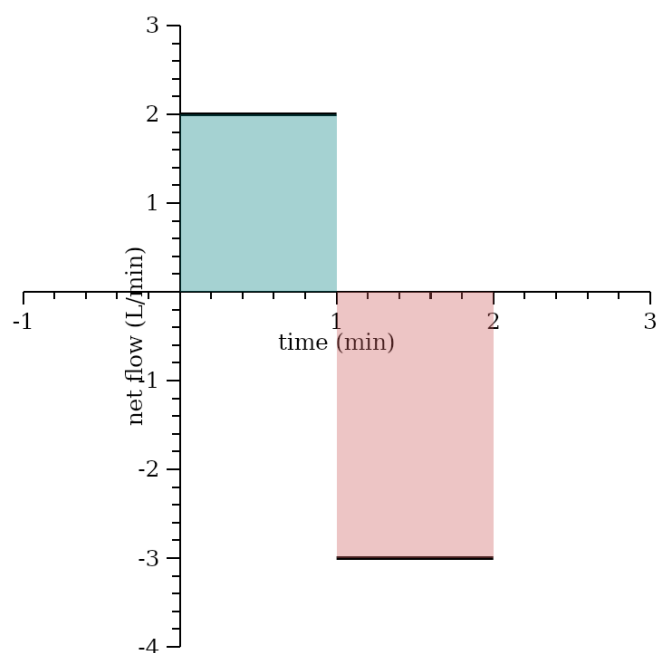
Applications of Integration

- 6 The graph shows net water flow $r(t)$ in L/min. How does the tank's volume change over the shown interval?



- A It gains 2 L, then loses 6 L; the net change is 4 L.
- B It gains 2 L, then loses 6 L; the net change is -4 L.
- C It gains 2 L, then gains 6 L; the net change is 8 L.
- D It loses 6 L only; the net change is -6 L.

- 7 The graph shows a tank's net flow $r(t)$ in L/min. It begins with 20 L. Which setup gives its final volume?



- A $20 + \int_2^0 r(t) dt$
- B $20 + \int_0^2 r(t) dt$
- C $\int_0^2 r(t) dt$
- D $20 + \int_0^2 |r(t)| dt$



Applications of Integration

- 8** A tank begins with 37 L, receives 4 L/min for 1 min, then drains 8 L/min for 1 min. Which setup gives its final volume?

A $\int_0^1 4 dt + \int_1^2 (-8) dt$

B $37 + \int_1^0 4 dt + \int_2^1 (-8) dt$

C $37 + \int_0^1 4 dt + \int_1^2 8 dt$

D $37 + \int_0^1 4 dt + \int_1^2 (-8) dt$

- 9** Velocity is 6 m/s on $0 \leq t < 1$ and -5 m/s on $1 \leq t \leq 2$. What is the vehicle's displacement from $t=0$ to $t=2$?

A 6 m

B 1 m

C -1 m

D 11 m

- 10** A vehicle travels forward at 3 m/s for 1 s, then backward at 3 m/s for 1 s. Which setup gives its total distance?

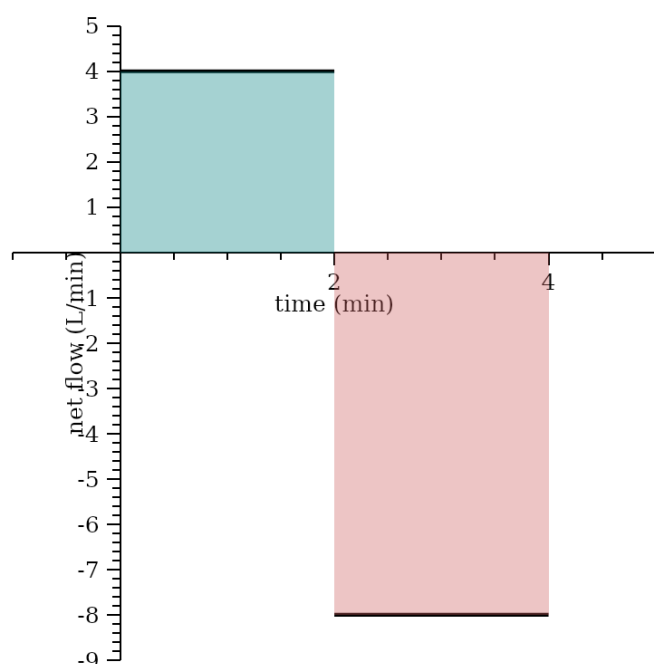
A $\int_0^1 3 dt + \int_1^2 (-3) dt$

B $\int_0^1 3 dt - \int_1^2 (-3) dt$

C $\int_0^1 3 dt$

D $\int_0^1 3 dt - \int_1^2 3 dt$

- 11** The graph shows a tank's net flow $r(t)$ in L/min. It starts with 57 L. How much water is in the tank at the end?



A The tank starts with 57 L, gains 8 L, then loses 16 L; it ends with 65 L.

B The tank starts with 57 L, gains 8 L, then loses 16 L; its final volume is -8 L.

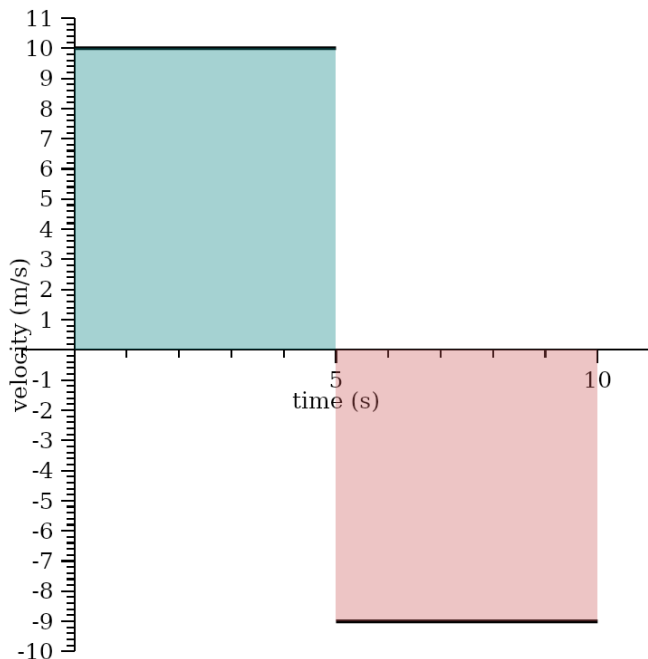
C The tank starts with 57 L, gains 8 L, then loses 16 L; it ends with 49 L.

D The tank starts with 57 L, gains 8 L, then gains 16 L; it ends with 81 L.



Applications of Integration

12 The graph shows a vehicle's velocity $v(t)$ in m/s. Which setup gives its displacement over the shown time interval?



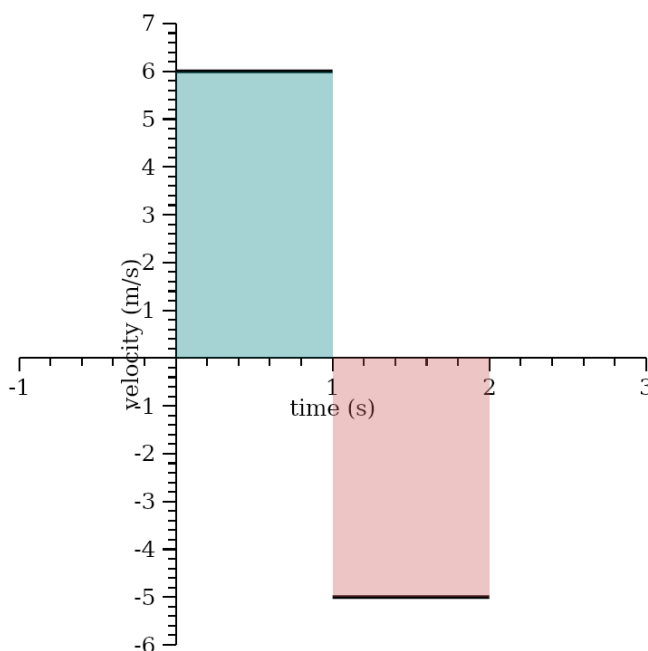
A
$$\int_0^5 v(t) dt = 5 \cdot 10$$

B
$$\int_0^{10} v(t) dt = 5 \cdot 10 + 5 \cdot (-9)$$

C
$$\int_{10}^0 v(t) dt = 5 \cdot 10 + 5 \cdot (-9)$$

D
$$\int_0^{10} |v(t)| dt = 5 \cdot 10 + 5 \cdot (9)$$

13 The graph shows a vehicle's velocity $v(t)$ in m/s. What does its signed displacement over the shown interval mean?



A It moves forward 6 m only; its displacement is 6 m.

B It moves forward 6 m, then backward 5 m; its displacement is 1 m.

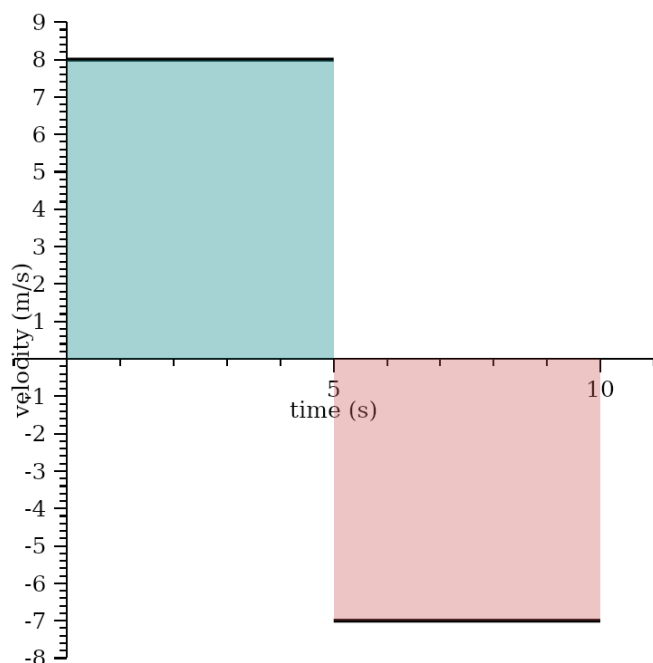
C It moves forward 6 m, then backward 5 m; its displacement is 11 m.

D It moves forward 6 m, then backward 5 m; its displacement is -1 m.



Applications of Integration

14 The graph shows velocity $v(t)$ in m/s changing sign. Which setup gives the total distance traveled?



A
$$\int_0^5 v(t) dt - \int_5^{10} v(t) dt$$

B
$$\int_0^5 v(t) dt + \int_5^{10} v(t) dt$$

C
$$\int_5^{10} v(t) dt - \int_0^5 v(t) dt$$

D
$$\int_0^5 v(t) dt$$

15 Velocity $v(t)$ is 4 m/s on $0 \leq t < 1$ and -2 m/s on $1 \leq t \leq 2$. Evaluate $\int_0^2 |v(t)| dt$, splitting where v changes sign.

A 4 m

B 6 m

C 2 m

D -6 m

17 Find the geometric area between the line and the x-axis, splitting at its zero.

$$f(x) = -2(x - 2), \quad 0 \leq x \leq 6$$

A 12 square units

B -12 square units

C 4 square units

D 20 square units

16 Which split integral gives the geometric area between the line and the x-axis?
 $f(x) = -2(x - 10), \quad 0 \leq x \leq 12$

A
$$\int_0^{10} f(x) dx + \int_{10}^{12} f(x) dx$$

B
$$-\int_0^{10} f(x) dx + \int_{10}^{12} f(x) dx$$

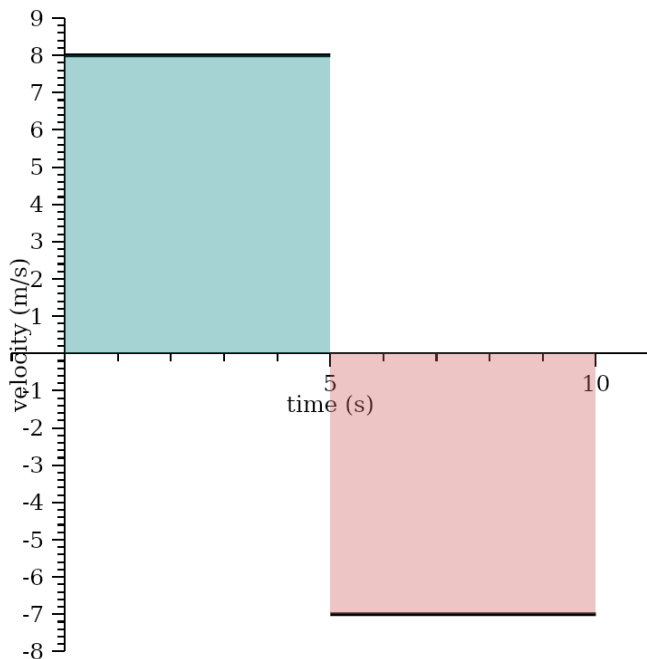
C
$$\int_0^{10} f(x) dx - \int_{10}^{12} f(x) dx$$

D
$$\int_0^{10} f(x) dx$$



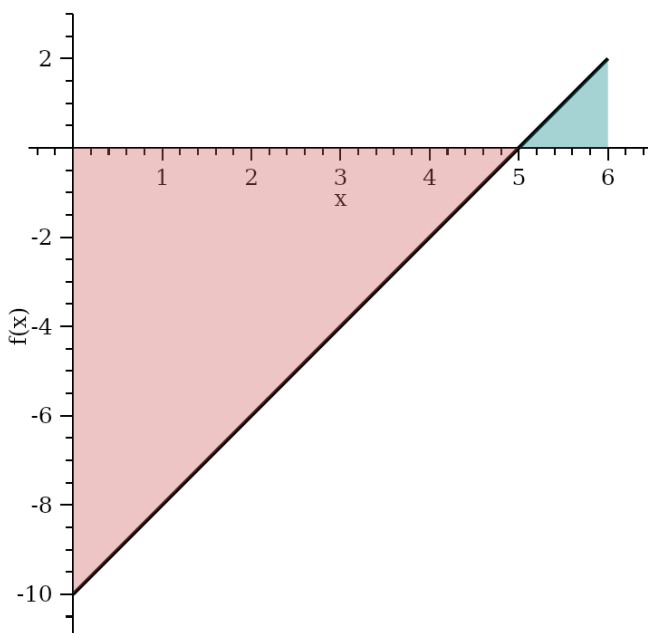
Applications of Integration

18 The graph shows a vehicle's velocity $v(t)$ in m/s. What is the total distance traveled over the shown interval?



- A It travels forward 40 m, then backward 35 m; its total distance is 5 m.
- B It travels forward 40 m, then backward 35 m; its total distance is -75 m.
- C It travels forward 40 m, then backward 35 m; its total distance is 75 m.
- D It travels forward 40 m only; its total distance is 40 m.

19 The graph of $f(x)$ crosses the x -axis at $x=5$. Which split integral gives the geometric area between f and the axis from 0 to 6?

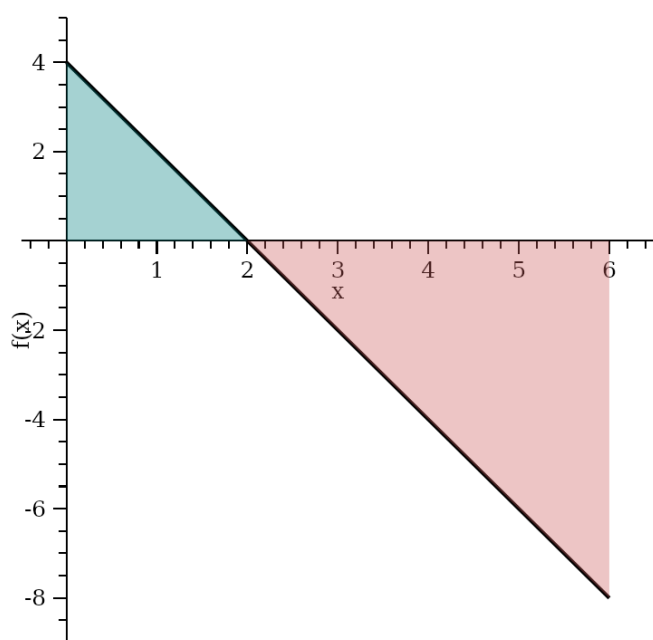


- A $\int_0^5 f(x) dx + \int_5^6 f(x) dx$
- B $-\int_0^5 f(x) dx + \int_5^6 f(x) dx$
- C $\int_0^5 f(x) dx - \int_5^6 f(x) dx$
- D $-\int_0^5 f(x) dx$



Applications of Integration

20 The graph of $f(x)$ crosses the x -axis at $x=2$. What is the total area of its two shaded regions from 0 to 6?



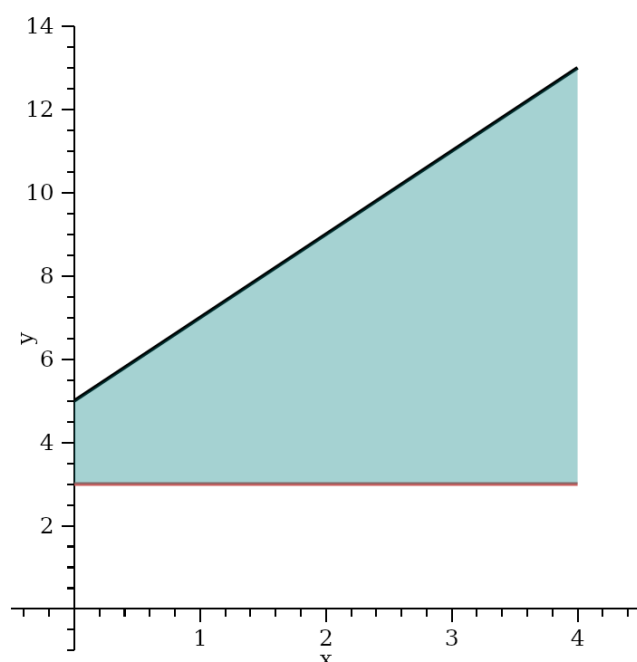
A
The regions have areas 4 and 16;
the total is 4 square units.

B
The regions have areas 4 and 16;
the total is 20 square units.

C
The regions have areas 4 and 16;
the total is 12 square units.

D
The regions have areas 4 and 16;
the total is -12 square units.

21 The shaded region lies between $f(x)$ (upper) and $g(x)$ (lower) from $x=0$ to $x=4$. Which integral gives its area?



A
$$\int_0^4 (g(x) - f(x)) dx$$

B
$$\int_0^4 (f(x) - g(x)) dx$$

C
$$\int_0^4 (f(x) + g(x)) dx$$

D
$$\int_0^4 f(x) dx$$



Applications of Integration

- 22** The first curve remains above the second. Which integral finds the enclosed area?

$$f(x) = (3 + 2x), \quad g(x) = 1, \quad 0 \leq x \leq 5$$

A $\int_0^5 ((3 + 2x) - 1) dx$

B $\int_0^5 ((3 + 2x) + 1) dx$

C $\int_0^5 (3 + 2x) dx$

D $\int_0^5 (1 - (3 + 2x)) dx$

- 24** Evaluate the geometric area between the curves over the given interval.

$$f(x) = 4 + 8(x - 2)(x - 4)(x - 6)$$

$$g(x) = 4, \quad 0 \leq x \leq 8$$

A 640 square units

B 576 square units

C -640 square units

D 0 square units

- 23** Evaluate the area integral below, with the first curve above the second.

$$f(x) = (14 - 2x), \quad g(x) = 4$$

$$A = \int_0^3 ((14 - 2x) - 4) dx$$

A

33 square units

B

21 square units

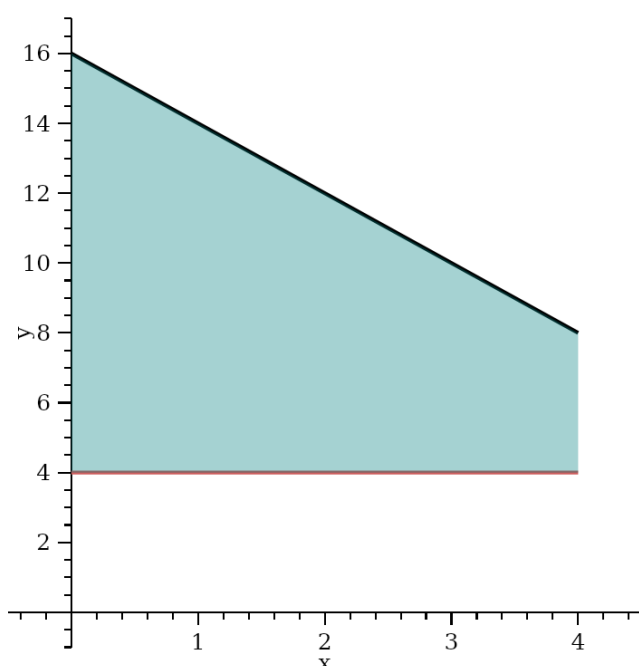
C

-21 square units

D

45 square units

- 25** For the shaded region between $f(x)$ (upper) and $g(x)$ (lower) from $x=0$ to $x=4$, what does the area integral measure?



A The vertical gap $g(x) - f(x)$ accumulated over the interval is 32 square units.

B The area under $f(x)$ alone is 32 square units.

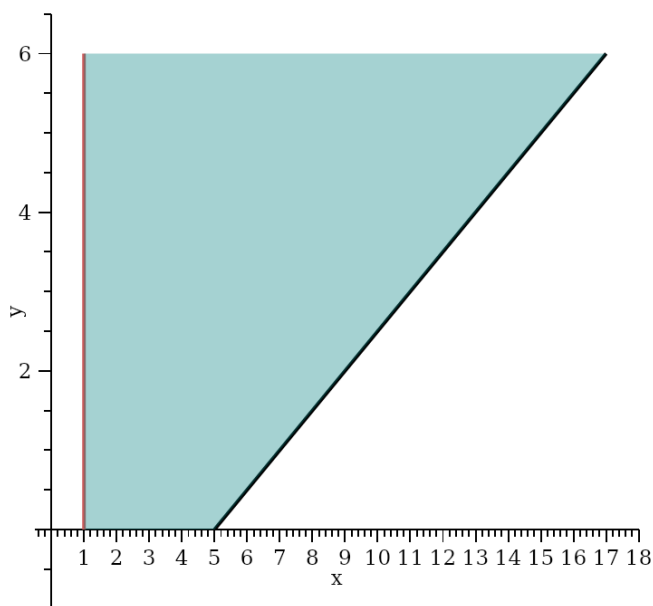
C The vertical gap $f(x) - g(x)$ accumulated over the interval is 32 square units.

D The enclosed area is -32 square units.



Applications of Integration

- 26** The shaded region lies between the right-hand curve $x_{\text{right}}(y)$ and left-hand curve $x_{\text{left}}(y)$ from $y=0$ to $y=6$. Which integral gives its area?



A
$$\int_0^6 (x_{\text{right}}(y) - x_{\text{left}}(y)) dy$$

B
$$\int_0^6 x_{\text{right}}(y) dy$$

C
$$\int_0^6 (x_{\text{right}}(y) + x_{\text{left}}(y)) dy$$

D
$$\int_0^6 (x_{\text{left}}(y) - x_{\text{right}}(y)) dy$$

- 27** The first curve is to the right of the second. Which integral finds the enclosed area?

$$x_{\text{right}}(y) = (5 + 2y), \quad x_{\text{left}}(y) = 3$$

$$A = \int_0^2 ((5 + 2y) - 3) dy$$

A
$$\int_0^2 (3 - (5 + 2y)) dy$$

B
$$\int_0^2 ((5 + 2y) + 3) dy$$

C
$$\int_0^2 (5 + 2y) dy$$

D
$$\int_0^2 ((5 + 2y) - 3) dy$$

- 28** Evaluate the area integral below, with the first curve to the right of the second.

$$x_{\text{right}}(y) = (16 - 2y), \quad x_{\text{left}}(y) = 2$$

$$A = \int_0^6 ((16 - 2y) - 2) dy$$

A 48 square units

B -48 square units

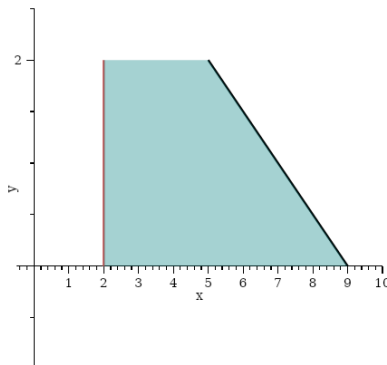
C 72 square units

D 60 square units



Applications of Integration

29 For the shaded region between $x_{\mathrm{right}}(y)$ and $x_{\mathrm{left}}(y)$ from $y=0$ to $y=2$, what does the area integral measure?



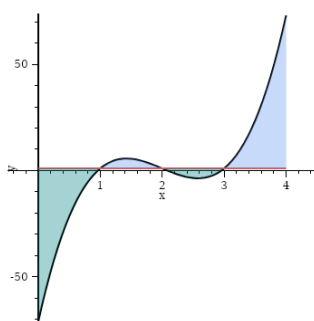
A

The horizontal gap $x_{\mathrm{right}}(y) - x_{\mathrm{left}}(y)$ accumulated over the interval is 10 square units.

B

The horizontal gap $x_{\mathrm{left}}(y) - x_{\mathrm{right}}(y)$ accumulated over the interval is 10 square units.

30 The black curve f and red line g intersect at $x=1$, 2 , and 3 . Which sum of integrals gives the total shaded area from 0 to 4 ?



A

$$\int_0^4 (f(x) - g(x)) dx$$

B

$$\begin{aligned} & - \int_0^1 (f(x) - g(x)) dx \\ & + \int_1^2 (f(x) - g(x)) dx \\ & - \int_2^3 (f(x) - g(x)) dx \\ & + \int_3^4 (f(x) - g(x)) dx \end{aligned}$$



Applications of Integration

31 Which sum of integrals gives the enclosed area for the curves below?

$$f(x) = 2 + 16(x-1)(x-2)(x-3)$$

$$g(x) = 2, \quad 0 \leq x \leq 4$$

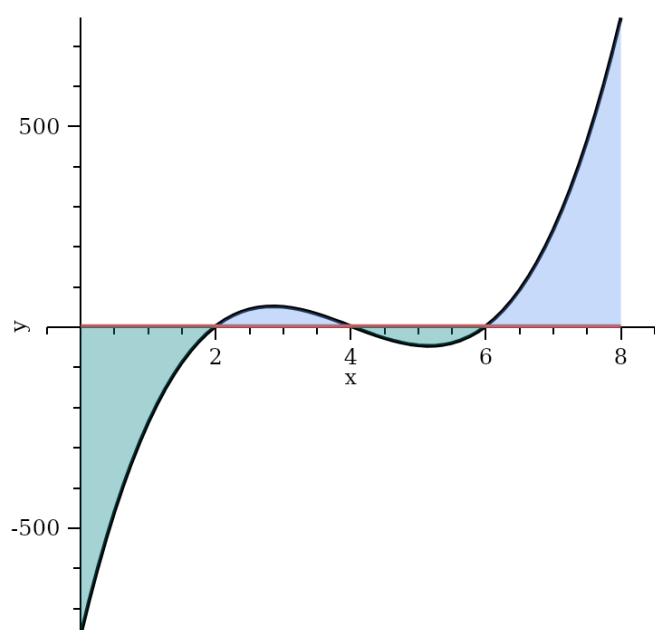
A

$$\begin{aligned} & - \int_0^1 (f(x) - g(x)) \, dx \\ & + \int_1^2 (f(x) - g(x)) \, dx \\ & - \int_2^3 (f(x) - g(x)) \, dx \\ & + \int_3^4 (f(x) - g(x)) \, dx \end{aligned}$$

B

$$\int_0^4 (f(x) - g(x)) \, dx$$

32 The black curve f crosses the red line g at $x=2, 4$, and 6 . What is the total area of the four shaded regions from 0 to 8 ?



A The two outer regions contribute 1152 square units; the inner regions can be omitted.

B The signed integrals cancel, so the total shaded area is 0 square units.

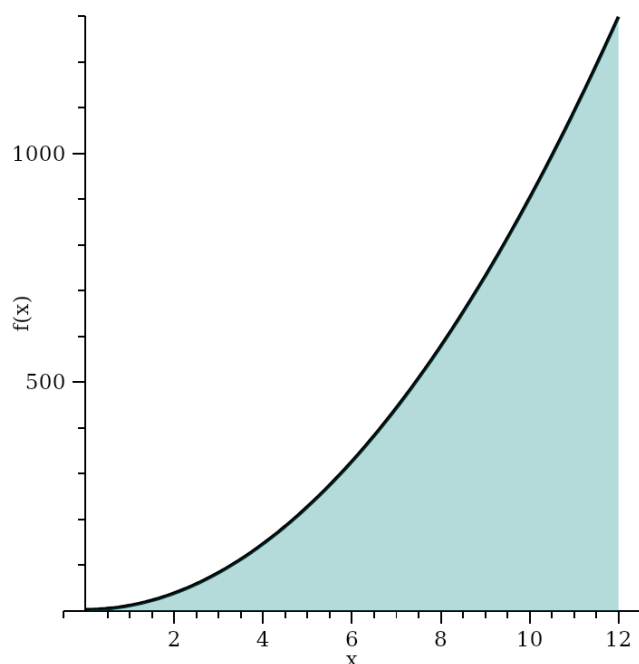
C The total shaded area is -1280 square units because f starts below g .

D The outer regions each have area 576, the inner regions each have area 64; total area is 1280 square units.



Applications of Integration

33 The graph shows positive $f(x)$ on $0 \leq x \leq 12$. Which expression gives its average value over this interval?



A
$$\frac{f(12) - f(0)}{12}$$

B
$$\frac{1}{12} \int_0^{12} f(x) dx$$

C
$$\frac{1}{12} \int_0^{12} f'(x) dx$$

D
$$\int_0^{12} f(x) dx$$

34 Which expression finds the average rate over the interval below?

$$f(x) = 12x^2 + 2, \quad 0 \leq x \leq 6$$

$$f_{\text{avg}} = \frac{1}{6} \int_0^6 f(x) dx$$

A
$$\frac{1}{6} \int_0^6 (12x^2 + 2) dx$$

B
$$\frac{f(6) - f(0)}{6}$$

C
$$\frac{f(0) + f(6)}{2}$$

D
$$\int_0^6 (12x^2 + 2) dx$$

35 Find the average value over the interval below.

$$f(x) = 6x^2 + 3, \quad 0 \leq x \leq 6$$

$$f_{\text{avg}} = \frac{1}{6} \int_0^6 f(x) dx$$

A 450 units

B 36 units

C 75 units

D 111 units

36 Evaluate the volume using washers about $x=0$.

$$R(y) = 4 + 2y, \quad r(y) = 1$$

$$V = \pi \int_0^3 (R^2 - r^2) dy$$

A 153π cubic units

B -153π cubic units

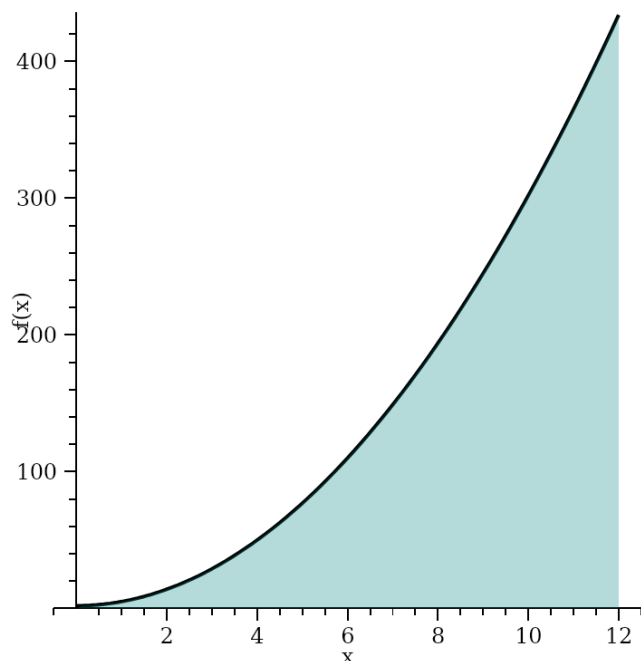
C 156π cubic units

D 153 cubic units



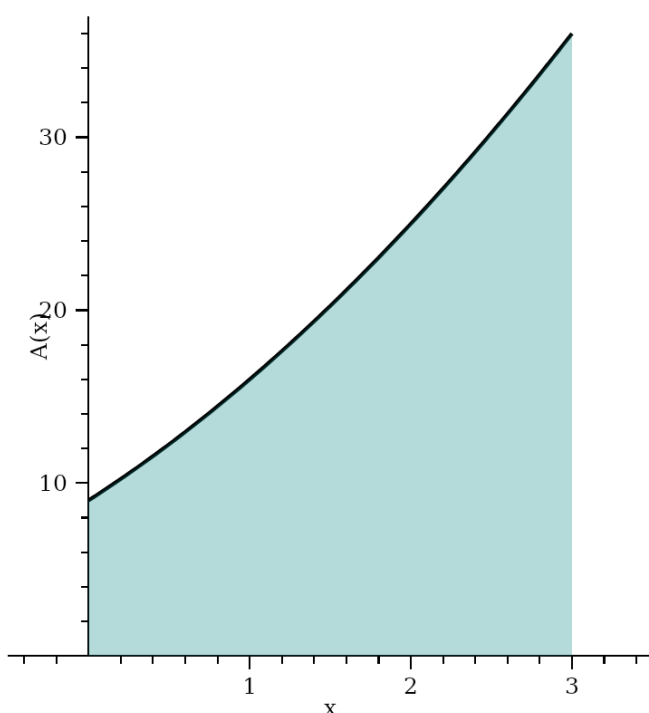
Applications of Integration

- 37** The shaded area under $f(x)=3x^2+2$ from 0 to 12 is 1752 square units. What is the graph's average function value?



- A The average is the mean of endpoint heights, 218 units.
- B The constant height with the same area over width 12 is 146 units.
- C The average is the total area, 1752 units.
- D The average is the endpoint rate of change, 36 units.

- 38** The graph shows cross-sectional area $A(x)$ from $x=0$ to $x=3$. Which integral gives the solid's volume?



- A $\int_0^3 [A(x)]^2 dx$
- B $\int_0^3 A(x) dx$
- C $\frac{1}{3} \int_0^3 A(x) dx$
- D $\int_3^0 A(x) dx$



Applications of Integration

- 39** Cross sections perpendicular to the x-axis are rectangles with sides $s(x)$ and $2s(x)$, where $s(x)=x+5$ and $0 \leq x \leq 3$. Which integral gives the volume?

A $\int_0^3 (x+5) dx$

B $\int_0^3 2(x+5)^2 dx$

C $\frac{1}{3} \int_0^3 2(x+5)^2 dx$

D $\int_3^0 2(x+5)^2 dx$

- 40** Evaluate the volume integral for the cross-sectional area below.

$$A(x) = \frac{\pi}{2}(x+5)^2, \quad V = \int_0^3 A(x) dx$$

A 258 cubic units

B 129 cubic units

C 129π cubic units

D $\frac{129\pi}{2}$ cubic units

- 41** Evaluate the volume of the solid of revolution below.

$$R(x) = 8 + 2x, \quad V = \pi \int_0^3 [R(x)]^2 dx$$

A 372π cubic units

B 744π cubic units

C $\frac{372\pi}{2}$ cubic units

D 372 cubic units

- 42** A path is parameterized by $x(t)=60t$ and $y(t)=80t$, for $0 \leq t \leq 3$. Which integral gives its arc length?

A $\int_0^3 (60+80) dt$

B $\int_0^3 \sqrt{(60)^2 - (80)^2} dt$

C $\int_0^3 \sqrt{1 + (80)^2} dt$

D $\int_0^3 \sqrt{(60)^2 + (80)^2} dt$

- 43** Evaluate the work below, with force in newtons and displacement in metres.

$$W = \int_0^3 (3+8x) dx$$

A 15 joules

B 45 newtons

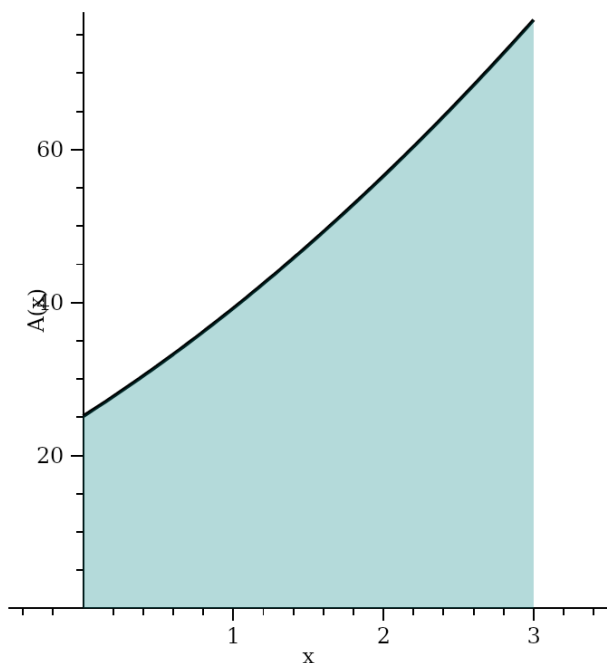
C -45 joules

D 45 joules



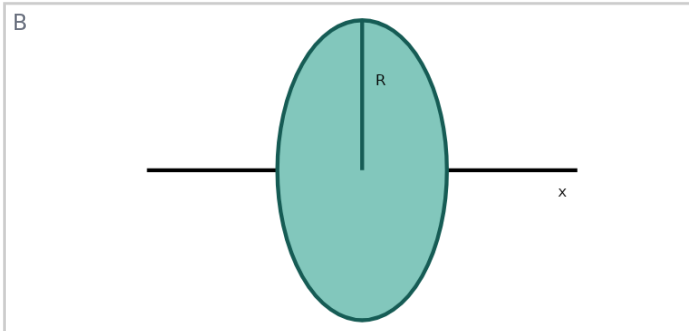
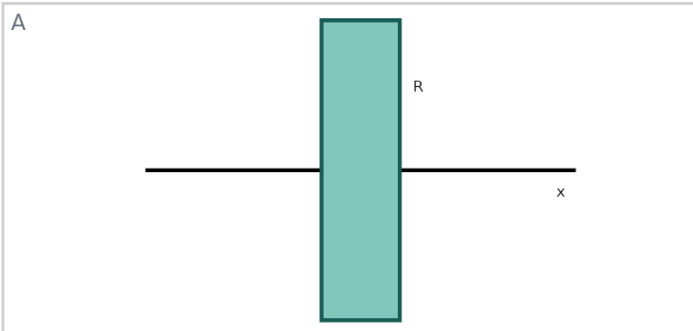
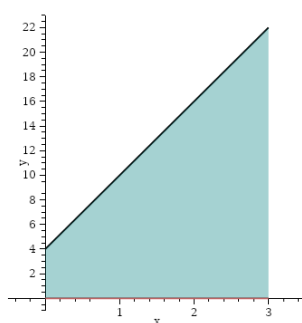
Applications of Integration

- 44** The shaded graph shows $A(x) = \frac{\pi}{2}(x+4)^2$, the area of each cross section from $x=0$ to $x=3$. What does the shaded integral represent?



- A It gives a single cross-sectional area of $93\pi/2$ square units.
- B It gives the average cross-sectional area of $93\pi/2$ square units.
- C It accumulates cross-sectional areas into a volume of $93\pi/2$ cubic units.
- D It gives a negative volume of $-93\pi/2$ cubic units.

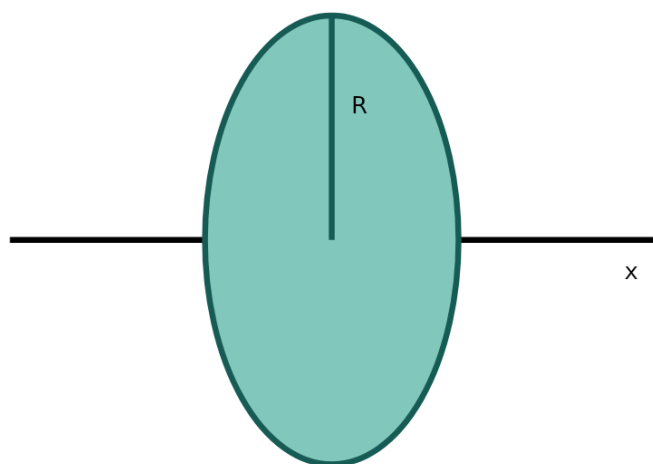
- 45** The shaded region is bounded by $y=4+6x$, the x -axis, $x=0$, and $x=3$. It is revolved about the x -axis. Which cross-sectional diagram shows a disc perpendicular to the x -axis?





Applications of Integration

- 46** The diagram shows a filled disc perpendicular to the x-axis with radius $R(x)=4+2x$, for $0 \leq x \leq 3$. Which integral gives the solid's volume?



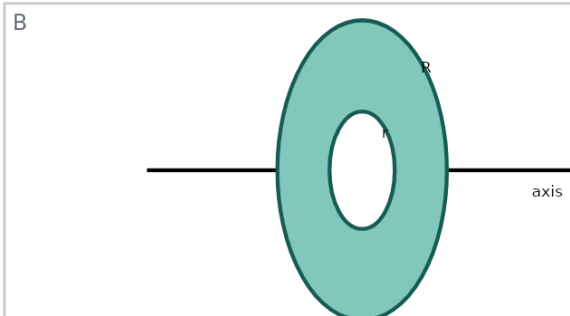
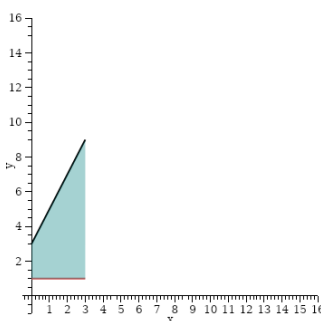
A
$$\pi \int_0^3 (4 + 2x) dx$$

B
$$\pi \int_0^3 ((4 + 2x)^2 - 1) dx$$

C
$$\int_0^3 (4 + 2x)^2 dx$$

D
$$\pi \int_0^3 (4 + 2x)^2 dx$$

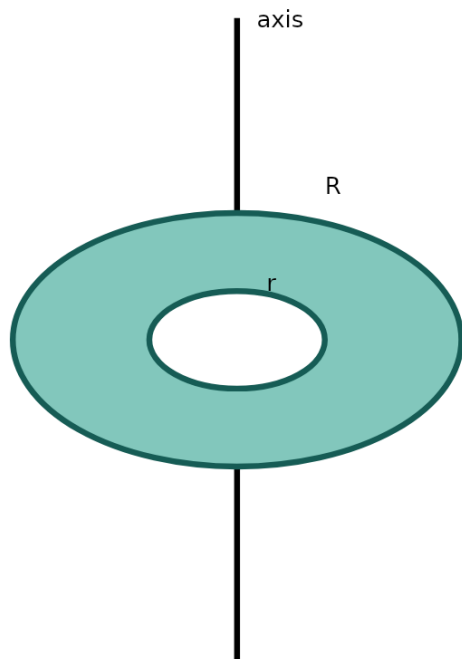
- 47** The shaded region lies between $y=0+1$ and $y=0+3+2x$, for $0 \leq x \leq 3$. It is revolved about $y=0$. Which diagram shows a washer perpendicular to the rotation axis?





Applications of Integration

- 48** The washer diagram shows outer radius $R(y)=3+4y$ and inner radius $r(y)=1$ about $x=1$, for $0 \leq y \leq 3$. Which integral gives the volume?



A

$$\pi \int_0^3 (3+4y)^2 dy$$

B

$$\pi \int_0^3 ((3+4y)-1)^2 dy$$

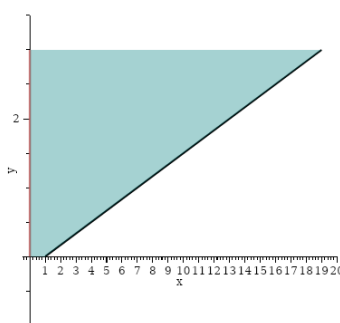
C

$$\pi \int_0^3 ((3+4y)^2 + 1^2) dy$$

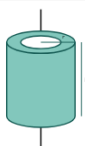
D

$$\pi \int_0^3 ((3+4y)^2 - 1^2) dy$$

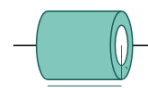
- 49** The shaded region is bounded by $x=0$ and $x=1+6y$, for $0 \leq y \leq 3$. Revolve it about the x -axis. Which diagram shows a cylindrical shell parallel to the axis?



A



B



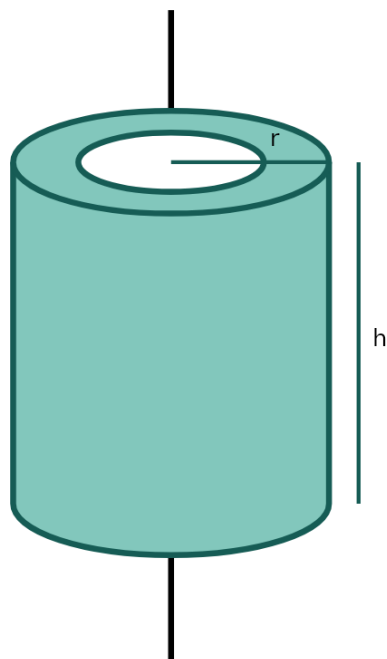
C





Applications of Integration

- 50** The diagram shows a hollow cylindrical shell about the y-axis, with radius $r(x)=x$ and height $h(x)=1+6x$, for $0 \leq x \leq 3$. Which integral gives the volume?



A

$$2\pi \int_0^3 x(1+6x) dx$$

B

$$\pi \int_0^3 x(1+6x) dx$$

C

$$2\pi \int_0^3 x^2(1+6x) dx$$

D

$$2\pi \int_0^3 (1+6x) dx$$

- 51** Evaluate the volume using shells about the y-axis.

$$r(x) = x, \quad h(x) = 1 + 4x$$

$$V = 2\pi \int_0^3 r(x)h(x) dx$$

A

 81π cubic units

B

 $\frac{81\pi}{2}$ cubic units

C

 162π cubic units

D

81 cubic units

- 52** Evaluate the arc-length integral below.

$$\int_0^3 \sqrt{1+(2)^2} dx$$

A

15 units

B

6 units

C

 $3\sqrt{5}$ units

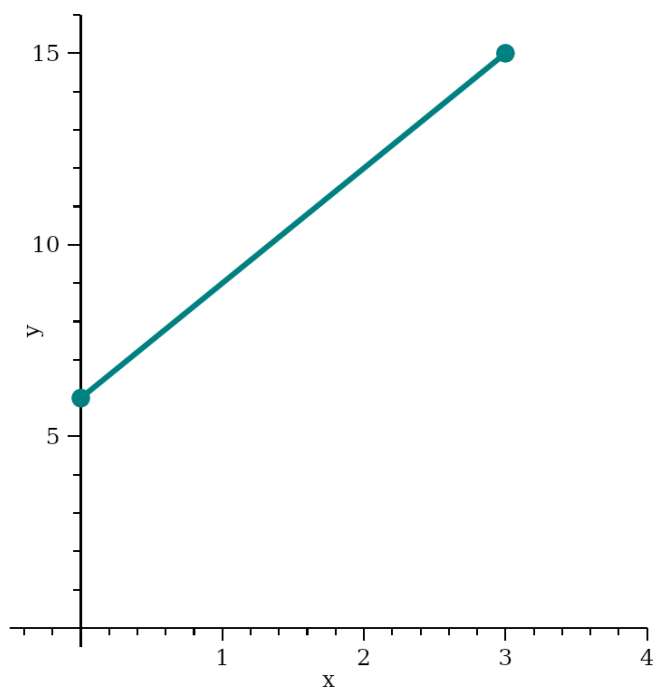
D

 $\sqrt{5}$ units



Applications of Integration

53 The graph shows $y=3x+6$ between marked $x=0$ and $x=3$. Which integral gives the length of the segment?



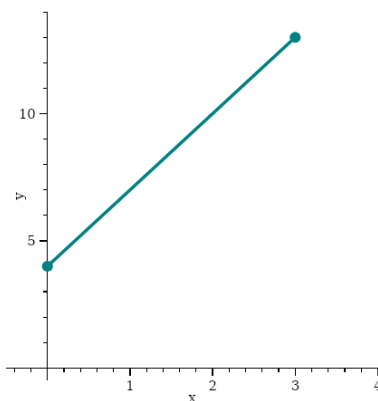
A
$$\int_0^3 (1 + 3^2) dx$$

B
$$\int_0^3 \sqrt{1 + (3)^2} dx$$

C
$$\int_0^3 3 dx$$

D
$$\int_0^3 \sqrt{1 + (4)^2} dx$$

54 The graph shows $y=3x+4$ between marked $x=0$ and $x=3$. What does its arc-length integral measure?



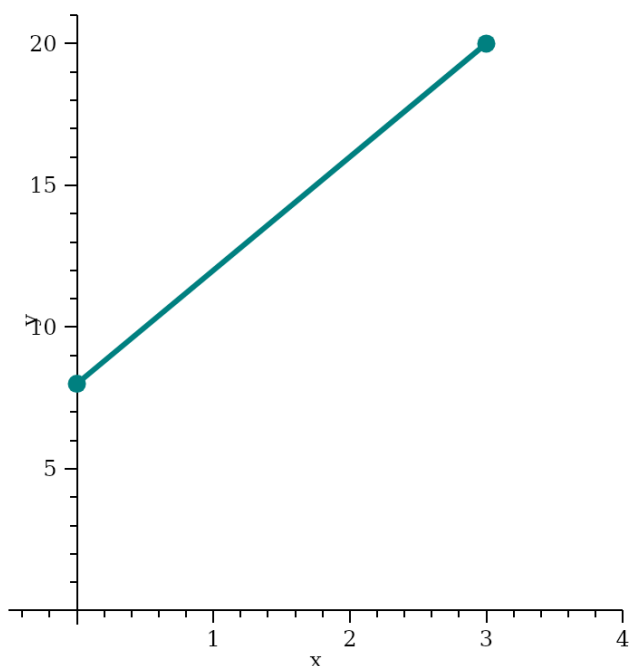
A The area under the segment is $3\sqrt{10}$ squared units.

B The distance along the segment is $3\sqrt{10}$ units.



Applications of Integration

55 The graph shows $y=8+4x$ for $0 \leq x \leq 3$, revolved about the x-axis. Which integral gives the lateral surface area?



A
$$2\pi \int_0^3 (8+4x) \sqrt{1+(4)^2} dx$$

B
$$2\pi \int_0^3 \sqrt{1+(4)^2} dx$$

C
$$\pi \int_0^3 (8+4x) \sqrt{1+(4)^2} dx$$

D
$$\pi \int_0^3 (8+4x)^2 dx$$

56 The line rotates about the x-axis. Which integral measures its lateral surface area?

$$y = 9 + 3x, \quad 0 \leq x \leq 3$$

A
$$\pi \int_0^3 (9+3x)^2 dx$$

B
$$2\pi \int_0^3 (9+3x) \sqrt{1+(4)^2} dx$$

C
$$2\pi \int_0^3 (9+3x) \sqrt{1+(3)^2} dx$$

D
$$2\pi \int_0^3 (9+3x) dx$$

57 Evaluate the lateral surface area below.

$$S = 2\pi \int_0^3 (4+2x) \sqrt{1+(2)^2} dx$$

A
$$42\pi\sqrt{5} \text{ cubic units}$$

B
$$\frac{42\pi\sqrt{5}}{2} \text{ square units}$$

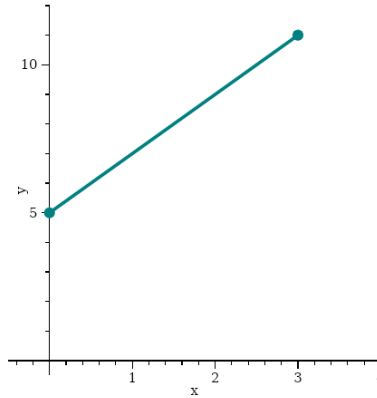
C
$$42\pi\sqrt{5} \text{ square units}$$

D
$$42\pi \text{ square units}$$



Applications of Integration

58 The graph shows $y=5+2x$ for $0 \leq x \leq 3$. What does its surface-area integral about the x -axis measure?



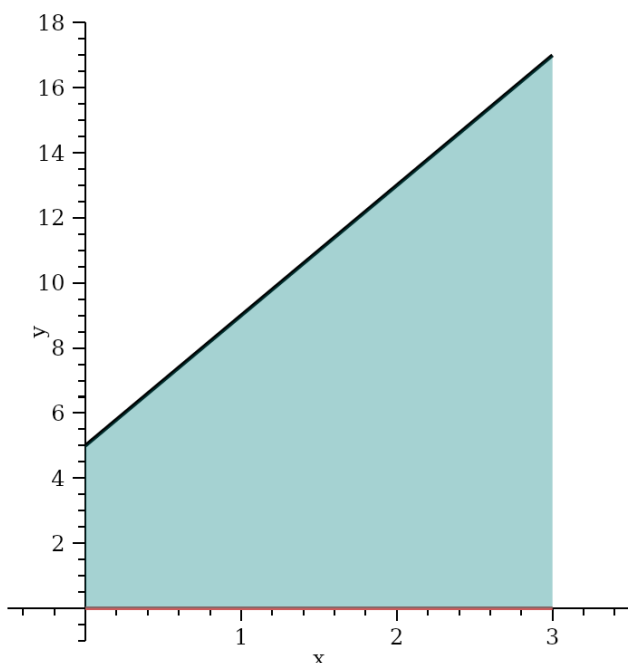
A

The volume of the solid is $48\pi\sqrt{5}$ cubic units.

B

The lateral area swept out by the segment is $48\pi\sqrt{5}$ square units.

59 The shaded graph shows force $F(x)=(5+4x)$ newtons against displacement x in metres from 0 to 3. Which integral gives the work?



A

$$\int_3^0 (5 + 4x) dx$$

B

$$\int_0^3 (5 + 4x) dx$$

C

$$\int_0^3 x(5 + 4x) dx$$

D

$$\int_0^3 (5 + 4x)^2 dx$$



Applications of Integration

60 A variable force moves an object in its direction. Which integral gives the work, in joules?

$$F(x) = (4 + 8x) \text{ N}, \quad 0 \leq x \leq 3 \text{ m}$$

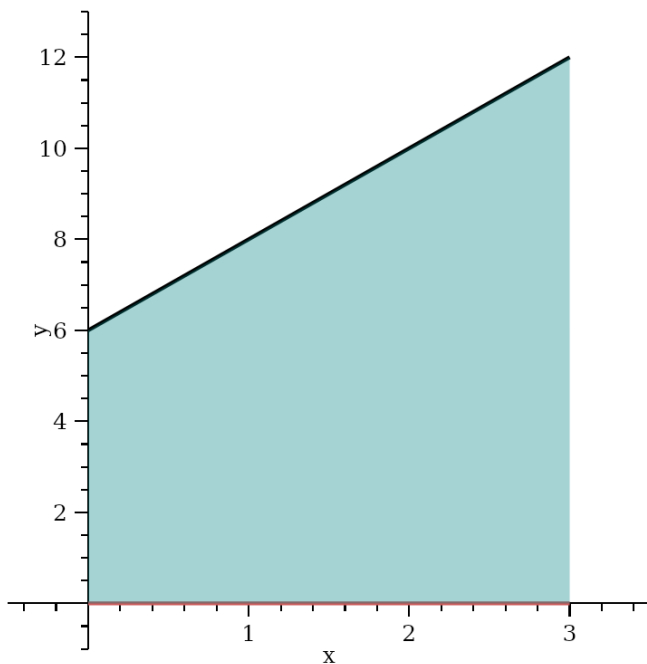
A $\int_0^3 x(4 + 8x) dx$

B $\int_0^3 (4 + 8x) dx$

C $\int_0^3 8 dx$

D $\int_0^3 (4 + 8x)^2 dx$

61 The shaded graph shows $F(x) = (6 + 2x)$ newtons over a displacement of 0 to 3 metres. What does the shaded region represent?



A The distance travelled is 27 metres.

B The work done by the force is 27 joules.

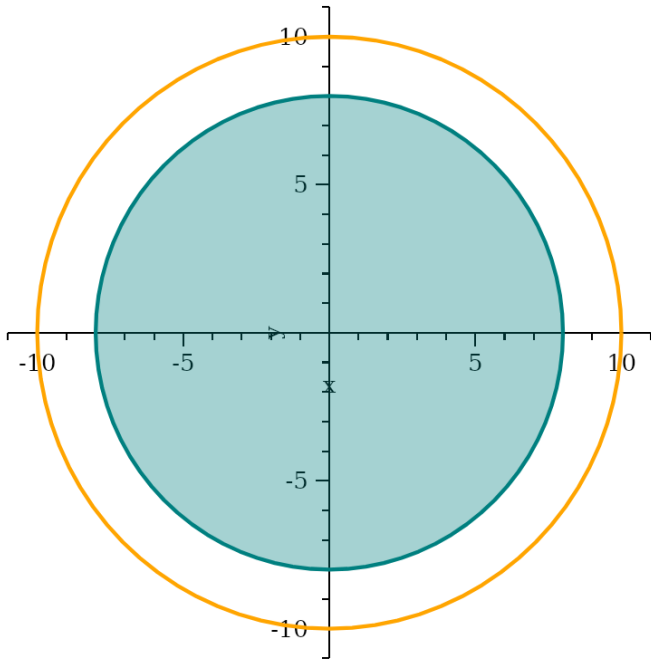
C The work done by the force is -27 joules.

D The force at $x=3$ is 27 newtons.



Applications of Integration

62 The shaded polar region is common to $r=8$ and $r=10$. Which angular bounds enclose the region?



A

$$0 \leq \theta \leq 2\pi$$

B

$$0 \leq \theta \leq \frac{\pi}{3}$$

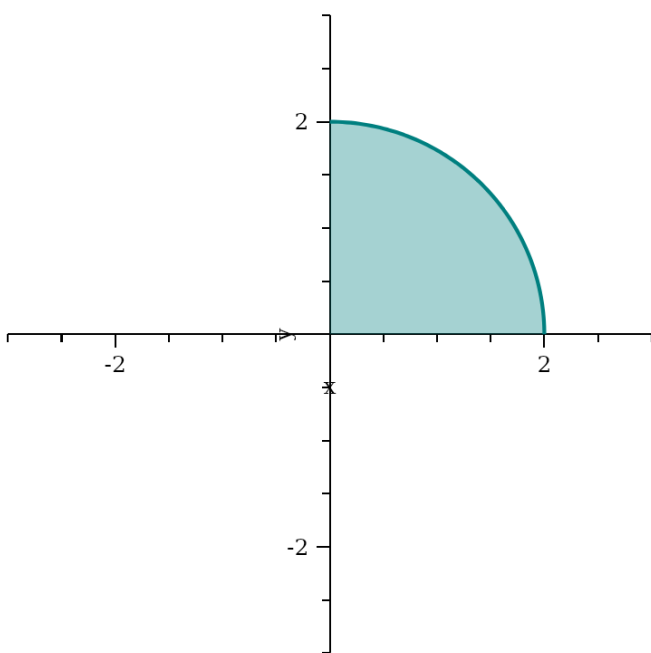
C

$$2\pi \leq \theta \leq 0$$

D

$$0 \leq \theta \leq \frac{\pi}{4}$$

63 The shaded polar region is inside $r=2$, from $\theta=0$ to $\theta=\pi/2$. Which integral gives its area?



A

$$\int_0^{\pi/2} 2^2 d\theta$$

B

$$\frac{1}{2} \int_0^{\pi/2} 2^2 d\theta$$

C

$$\frac{1}{2} \int_0^{\pi/2} (2+1)^2 d\theta$$

D

$$\frac{1}{2} \int_{\pi/2}^0 2^2 d\theta$$