



## MATHS

# **BOOKS - KC SINHA MATHS (HINGLISH)**

# APPLICATIONS OF INTEGRALS - FOR BOARDS

Solved Examples

**1.** Find the area enclosed by the circle of radius a.

2. Find the area of the region bounded by the parabola  $y^2 = 4ax$ , its axis and two ordinates x = 4 and x = 9

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**3.** Using integration, find the area of the region bounded by the parabola  $y^2 = 16x$  and the line

x = 4

4. Find the area of the region bounded by the

ellipse 
$$rac{x^2}{a^2}+rac{y^2}{b^2}=1$$

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5. Find the area of the smaller portion of the circle

$$x^2+y^2=4$$
 cut off by the line  $x^2=1$ 

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6. Find the area bounded by the ellipse  $rac{x^2}{a^2}+rac{y^2}{b^2}=1$  and the ordinates x=0 and x=ae,



8. Find the area between the x-axis and the curve

 $y=\sin x$  from x=0 to  $x=2\pi$ 

**9.** Find the area of the quadrilateral formed by the lines y = 2x + 3, y = 0, x = 2 and x = 4 using integration.

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**10.** Using integration, find the area of the region

bounded by the line 2y + x = 8, the x-axis and the

lines x = 2 and x = 4.

11. Find the area of the triangle formed by the lines

y=x+1, 3y=x+5 and y=-x+7 by

method of integration.



12. Find the area of the region bounded by the curve  $y = x^2$  and the line y = 4.

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13. Find the area bounded by the curve ert x ert + y = 1

and axis of x.



14. Find the area of the region bounded by  $y^2 = 4x, x = 1, x = 4$  and the x-axis in the first quadrant.

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15. Sketch the graph of y = |x + 3|. Evaluate

 $\int_{-6}^{0} |x+3| dx.$  What does the value of this

integral represent?

16. Using integration, find the area of the region bounded by the following curves, after curves, after making a rough sketch: y = 1 + |x + 1|, x = -3, x = 3, y = 0

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17. Find the area included between the line y=x

and the parabola  $x^2 = 4y$ .



and the line x = 4y2.



19. Find the area cut off from the parabola  $2y = 3x^2$  by the line 2y = 3x + 12.

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**20.** Using integration, find the area of the triangle ABC whose vertices are A(-1, 1), B(0, 5) and C(3, 2).



**21.** Using the method of integration find the area of the triangle ABC, coordinates of whose vertices are A(2, 0), B (4, 5) and C (6, 3).

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**22.** Find the area of the smaller region bounded by

the ellipse 
$$\displaystyle rac{x^2}{a^2} + \displaystyle rac{y^2}{b^2} = 1$$
and the line  $\displaystyle rac{x}{a} + \displaystyle rac{y}{b} = 1$ 

23. Find the area enclosed between first quadrant of a circle  $x^2 + y^2 = 16$  and line y = x. Watch Video Solution

24. Find the area of the region bounded by the

curves  $x = 2y - y^2$  and y = 2 + x.

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25. Find the area of the region bounded by  $y = x^2 + 1, y = x, x = 0$  and y = 2.



**27.** Find the area bounded by the parabola  $y^2=4x$ 

and the straight line x + y = 3.



**28.** Draw a rough sketch of the curves  $y = \sin x$ and  $y = \cos x$  as x varies from 0 to  $\frac{\pi}{2}$ . Find the area of the region enclosed by the curves and the y-axis.



#### 29. Find the area of the region bounded by the two

parabolas  $y = x^2$  and  $y^2 = x$ .

30. Find the area included between the curves

$$x^2 = 4y$$
 and  $y^2 = 4x$ .

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**31.** Find the area of the region included between the parabolas

$$y^2=4axandx^2=4ay, wherea>0.$$

32. Draw a rough sketch of the curves  $y^2 = x + 1$  and  $y^2 = -x + 1$  and find the area enclosed between them,

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**33.** Using integration, find the area of the region common to the circle  $x^2 + y^2 = 16$  and the parabola  $y^2 = 6x$ .

**34.** Find the area of the circle  $x^2 + y^2 = 16$  which is exterior to the parabola $y^2 = 6x$  by using integration.



**35.** Find the area, lying above the x=axis and included between the circle  $x^2 + y^2 = 8x$  and the parabola  $y^2 = 4x$ .

**36.** Prove that the curves  $y^2 = 4x$  and  $x^2 = 4y$  divide the area of the square bounded by x = 0, x = 4, y = 4 and y = 0 into three equal parts.





38. Find the area of the region enclosed between

the two circles  $x^2+y^2=1$  and  $(x-1)^2+y^2=1$ 

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39. Find the area of the region $igl\{(x,y)\!:\!0\leq y\leq x^2+1, 0\leq y\leq x+1, 0\leq x\leq 2igr\}$ 

**40.** Find the area of the region $\{(x, y): x^2 \le y \le |x|\}$  $\checkmark$  Watch Video Solution



**42.** Find the area of the region in the first quadrant enclosed by x-axis, line  $x = \sqrt{3}y$ and the circle



**2.** Find the area bounded by the line y = x, the x-

axis and the ordinates  $x=\,-\,1$  and x=2



y=3x+2, the x-axis and the ordinates  $x=\ -1$ 

and x=1

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4. Using integration, find the area of the region bounded by the line y - 1 = x,  $thex - a\xi s$  and the ordinates x = -2andx = 3.

5. Find the area of the quadrilateral formed by the

lines y = 2x + 3, y=0, x=4, x=6`.

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6. Find the area of the region bounded by the parabola  $y^2 = 4ax$ , its axis and two ordinates x = a and x = 2a.

7. Find the area of the region bounded by the curve

 $y^2=x$ and the lines x=1, x=4and the x-axis.

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 $y^2=4x, x=1, x=4$  and x-axis in the first

quadrant.



9. Find the area of the region bounded by  $y^2 = 9x, x = 2, x = 4$ and the x-axis in the first quadrant.



10. Find the area of the region bounded by  $x^2 = 4y$ , y = 2, y = 4 and the y-axis in the first quadrant.

**11.** Examples: Find the area bounded by the parabola  $y^2 = 4ax$  and its latus rectum. **Vatch Video Solution** 

12. Using integration, find the area of the region bounded by the parabola  $y^2=16x$  and the line x=4



**13.** Find the area bounded by the curve  $y^2 = 4ax$ 

and the lines y = 2a and y-axis.



14. The area between  $x = y^2$  and x = 4 is divided into two equal parts by the line x = a, find the value of a.



15. Find the area of the region bounded by the

ellipse 
$$rac{x^2}{4}+rac{y^2}{9}=1$$

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16. Find the area of the region bounded by the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$ . Watch Video Solution

17. Draw a rough sketch of the graph of the curve  $rac{x^2}{4}+rac{y^2}{9}=1$  and evaluate the area of the region



**19.** Using integration find the area of region bounded by the triangle whose vertices are (1, 0), (2, 2) and (3, 1).



**20.** Using the method of integration find the area of the region bounded by lines: 2x + y = 4, 3x2y = 6 and x3y + 5 = 0

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**21.** Find the area of the portion of an ellipse  $4x^2 + 9y^2 = 36$ , which is surrounding by the positive direction of x and y-axes.





23. Find the area of the triangle formed by the straight lines y = 2x, x = 0 and y = 2 by integration.



24. Find the area between x-axis and the curve

$$y=\sin x$$
, from  $x=0$  to  $x=\pi.$ 



$$x=0 \,\, \mathrm{and} \,\,, x=\pi.$$

**27.** Find the area between the curve  $y = x \sin x$ 

and x-axis from x = 0 to  $x = 2\pi$ .



**28.** Find the area bounded by the curve y = x |x|, x-

axis and ordinates x = -1 and x = 1.

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29. Find the area bounded by the curve  $y = 4x - x^2$ , the x-axis and the ordinates x = 1



**31.** Find the area of the region enclosed by the parabola  $x^2 = y$  , the line y = x + 2 and the x-axis.

**32.** Find the area of the region enclosed by the parabola  $x^2 = y$ , the line y = x + 2 and the x-axis.



parabola  $y=x^2$  and y=|x| .

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34. Find the area of the smaller region bounded by

the ellipse  $rac{x^2}{9}+rac{y^2}{4}=1$  and the line  $rac{x}{3}+rac{y}{2}=1$ 

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35. Find the area of the portion of the parabola

 $y^2 = 4x$  cut off by the line y = x.

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**36.** Find the area between the curve y = x and

$$y = x^2$$



**38.** Find the area enclosed by the curves  $y = 4x^2$ 

and  $y^2=2x.$ 

**39.** Find the area of the region in the first quadrant enclosed by the x-axis, the line y = x and the circle  $x^2 + y^2 = 32$ .

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**40.** Find the area of the circle  $4x^2 + 4y^2 = 9$  which

is interior to parabola  $y^2 = 4x$ .

**41.** Find the area of the region bounded by the curves  $x^2 + y^2 = 4$  and  $(x - 2)^2 + y^2 = 4$ . Watch Video Solution

42. Sketch the graph of y = |x - 5|. Evaluate  $\int_0^1 |x - 5| dx$ . What does this value of the integral

represent on the graph.



**43.** Sketch the graph y = |x + 1|. Evaluate  $\int_0^1 |x + 1| dx$ . What does this value of the integral

represent on the graph?



44. Using the method of integration find the area

bounded by the curve |x|+|y|=1.



**45.** Find the area of the region  $ig\{(x,y)\!:\!x^2+y^2\leq 1\leq x+yig\}$ Watch Video Solution 46. Find the area of the region  $ig\{x,y\!:\!x^2+y^2\leq 2ax,y^2\geq ax,x\geq 0,y\geq 0ig\}$ Watch Video Solution 47. Find the area bounded by curves  $ig\{(x,y)\!:\!y\geq x^2 \; ext{ and } \; y=|x|ig\}$ 

