MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

APPLICATION OF INTEGRALS

Others

1. Find the area enclosed by the curve $y = -x^2$ and straight line $x + y + 2 = 0$.

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

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3. Find the area bounded by the curve $y^2 = 4a^2(x - 1)$ and the lines $x = 1 and y = 4a$.

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4. Find the area of the smaller part of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$

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5. Find the area bounded by $x = at^2$ and $y = 2at$ between the ordinates corresponding to $t = 1$ and $t = 2$.

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6. Find the area enclosed by the curve $x = 3\cos t, y = 2\sin t$

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7. Sketch the region lying in the first quadrant and bounded by $y = 9x^2, x = 0, y = 1 and y = 4.$ Find the area of the region using integration.

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8. Find the area of the region bounded by $y = -1, y = 2, x = y^3$ and $x = 0.$

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9. Find the area of region bounded by $x^2 + 16y = 0$ and its latusrectum.

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10. Find the area of region bounded by the curve $ay^2 = x^3$, the y-axis and the lines $y = a$ and $y = 2a$.

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11. Find the area of the region included between the parabolas $y^2 = 4axandx^2 = 4ay, wherea > 0.$

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12. Find the area of the region bounded by the curve $y = x^3$ and the lines y = x + 6 and y =0.

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13. Find the area bounded by the curves $y = xandy = x^3.$

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14. Find the area bounded by the curves $y = 2x - x^2$ and the straight line $y = -x$.

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15. Find the area of the region between the parabola $x = y^2 - 6y$ and the line $x = -y$

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16. Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$.

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17. Determine the area under the curve $y = \sqrt{a^2 - x^2}$ included between the lines $x = 0 and x = a.$

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18. Find the area of the region bounded by the parabola $y^2 = 2x$ and straight line $x - y = 4$.

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19. Find the area of the region bounded by the curves $y = x^3$ and the lines $y = x + 6$ and $y = 0$.

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20. Using integration, find the area of the region bounded by the line $2y = -x + 8$,x-axis is and the

lines $x = 2$ and $x = 4$.

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21. If the area above x-axis bounded by the curves $y = 2^{kx} and x = 0$ and $x = 2is\frac{3}{(\log)_e 2}$, then find the value of k.

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22. Sketch the region bounded by $y = 2x - x^2$ and x-axis and find its area using integration.

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

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24. Find the area bounded by the curve $y=(x-1)(x-2)(x-3)$ lying between the ordinates $x=0 and x=3.$

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25. Find the area bounded by the curve $y = \sin x between x = 0 and x = 2\pi.$

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26. Sketh the graph $y = |x + 1|$. Evaluate $\int_{-3}^{1} |x + 1| dx$. What does this value represent on the graph?

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27. Compute the area bounded by the lines $x + 2y = 2, y - x = 1$ and $2x + y = 7$.

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28. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 4, \ x + y \geq 2\}$

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29. Using integration, find the area of the region bounded by the following curves after making a

rough sketch:

$y = 1 + |x + 1|, x = -2, x = 3, y = 0.$

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30. Draw a rough sketch of the curves $y = \sin x$ varies from 0 to $\frac{\pi}{2}$ and find the area of the region enclosed by them and x-axis

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31. Sketch the curves and identify the region bounded by the curves

$x = \frac{1}{2}, x = 2, y = \log x any = 2^x$. Find the area of this region.

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32. Compute the area of the figure bounded by the straight lines $x = 0, x = 2$ and the curves $y = 2^x, y = 2x - x^2$.

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33. If the area enclosed between the curves $y = ax^2 and x = ay^2 (a > 0)$ is 1 square unit, then

find the value of a.

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34. Find the area bounded by the curves $y = 6x - x^2 and y = x^2 - 2x$.

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35. Find the area of the region bounded by $y = \sqrt{x} and y = x$.

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36. Calculate the area of the region bounded by the parabolas $y^2 = 6x and x^2 = 6y$.

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37. Find the area enclosed by the curves $3x^2 + 5y = 32 and y = |x - 2|$.

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38. If the area bounded by the parabola $y^2 = 4ax$ and the line y=mx is $\frac{a^2}{12}$ sq. units, by using integration find the value of m.

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39. If the area enclosed by the parabolas $y^2 = 16axandx^2 = 16ay, a > 0is\frac{1024}{3}sq.$ units, find the value of $a.$

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40. Find the area bounded by the lines $y = 4x + 5, y = 5 - xand4y = x + 5.$

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41. Find the area enclosed by the curves $y = |x - 1| and y = -|x - 1| + 1.$

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42. Find the area bounded by the parabola $y^2 = 4ax$ and its latus rectum.

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43. Find the area of the region bounded by the parabola $y^2 = 2x$ and straight line $x - y = 4.$

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44. Find the area of the region bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

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45. Draw a rough sketch of the curve $y = \cos^2 x$ in $[0, 1]$ and find the area enclosed by the curve,the lines $x = 0, x = \pi$ and the x-axis.

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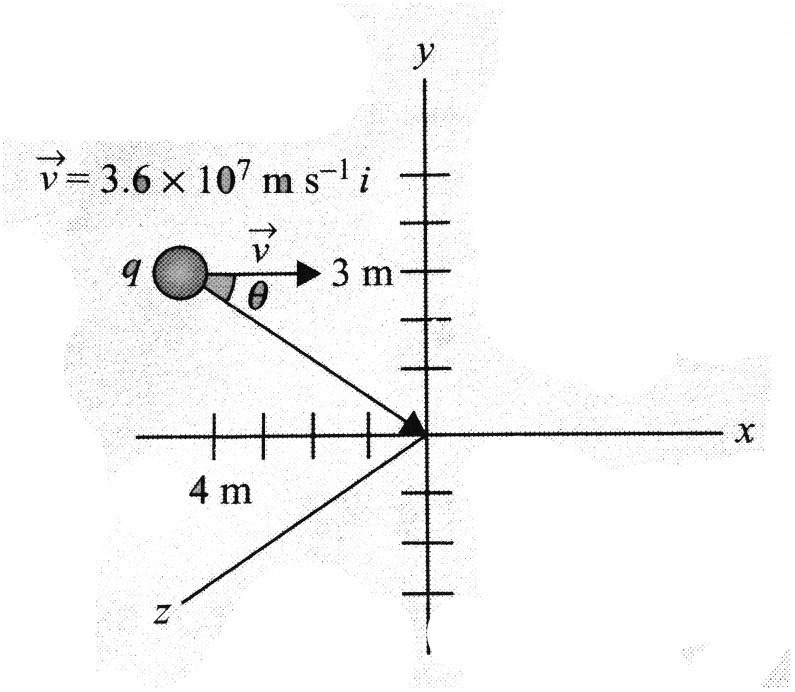
46. A point chanrge of magnitude $q = 4.5nC$ is moving with speed $v = 3.6 \times 10^7 ms^{-1}$ parallel to the x-axis along the line $y = 3m$. Find the magnetic field at the origin produced by this charge when the charge is at the point $x = -4m$, $y = 3m$, as shown in Fig.



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47. Using the integration, find the area of he region bounded by the following curves, after making a rough sketch:

$y = 1 + |x + 1|,\ x = -3,\ x = 3,\ y = 0.$

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48. Using integration, find the area of the triangle formed by positive x-axis and tangent and normal to the circle $x^2 + y^2 = 4$ at $\left(1, \sqrt{3}\right)$.

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49. Using the method of integration find the area bounded by the curve $|x| + |y| = 1$.

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50. Find the integration, find the area of the region bounded between the line $x = 2\, and$ the parabola $y^2 = 8x$.

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51. Find the area of the region bounded parabola $y^2 = 4ax$ and the line $x = a$.

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52. Find the area lying above the x-axis and under the parabola $y = 4x - x^2$

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53. Draw a rough sketch to indicate the region bounded between the curve $y^2 = 4ax$ and the line

$x = 3$. also, find the area of this region.

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54. Make a rough sketch of the graph of the function $y = 4 - x^2,\ 0 \leq x \leq 2$ and determine the area enclosed by the curve, the x-axis and the lines $x = 0\ and\ x = 2.$

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55. Using integration, find the area bounded by the lines x+2y=2, y−x=1 and 2x+y=7

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56. Find the area under the curve $y = \sqrt{6x + 4}$ (above the x-axis) from x=0 to x=2

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57. Draw the rough sketch of $y^2 + 1 = x,\ x \leq 2.$ Find the area enclosed by the curve and the line $x = 2.$

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58. Draw a rough sketch of the graph of the curve $\frac{x^2}{4} + \frac{y^2}{9} = 1$ and evaluate the area of the region under the curve and above the x-axis.

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59. Sketch the region $\left|(x, y) : 9x^2 + 4y^2 = 36\right|$ and find the area of the region enclosed by it using integration.

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60. Draw rough sketch of the graph of the function $y = 2\sqrt{1-x^2}$, $x \in [0, 1]$ and evaluate the area enclosed between the curve and the x-axis.

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61. Using integration, find the area of the region bounded by the line $2y = 5x + 7$, x-axis and the lines x = 2 and x = 8.

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62. 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.

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63. Sketch the graph of $y = |x + 3|$. Evaluate $\int_{-6}^0 |x + 3| dx$. What does the value of this integral represent?

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64. Sketch the graph $y = |x + 1|$. Evaluate $\int_{-4}^{2} |x + 1| dx$. What does the value of this integral represent on the graph?

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65. The area of the region bounded by the curve y = x + 1 and the lines $x = 2, x = 3,$ is

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66. Draw a rough sketch of the curve $y = \frac{x}{\pi} + 2\sin^2 x$ and find the area between the x-axis, the curve and the ordinates $x = 0 \, and \, x = \pi$.

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67. Draw a rough sketch of the curve $y = \frac{x}{\pi} + 2\sin^2 x$, and find the area between the x-axis, the curve and the ordinates $x = 0$ and , $x = \pi$.

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68. Find the area bounded by the curve $y = \cos x$, x-axis and the ordinates $x = 0 \, and \, x = 2\pi$.

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69. Show that the areas under the curves $y = \sin x \, and \, y = \sin 2x$ between $x = 0 \, and \, x = \frac{\pi}{3}$ are in the ratio 2:3.

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70. Compare the areas under the curves $y = \cos^2 x \, and \, y = \sin^2 x$ between

$x = 0 \, and \, x = \pi$.

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71. Find the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$and the ordinates $x = 0$and$x = ae$, where, $b^2 = a^2\left(1 - e^2\right)ande < 1$.

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72. Examples: Find the area of the region bounded by the curve $y^2 = 2y - x$ and the y-axis.

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73. Find the area bounded by the curve $y^2 = 4ax$ and the lines $y = 2\, and$ y-axis.

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74. Find the area of the region lying in the first quadrant and bounded by $y = 4x^2$, $x = 0, y = 1 and y = 4.$

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75. Find the area of the region bounded by $x^2 = 16y,\ y = 1,\ y = 4$ and the y-axis in the first quadrant.

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76. Find the area of the region bounded by $x^2 = 4ay$ and its latus rectum.

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77. Find the area enclosed between the parabola $4y = 3x^2$ and the straight line $3x - 2y + 12 = 0$

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78. Find the area bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$.

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79. Find the area enclosed between the parabola $y^2 = 4ax$and the line $y = mx$.

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80. Find the area of the region bounded by the curves $y = x^2 + 2, y = x, x = 0, and x = 3.$

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81. Find the area of the region bounded by $y = \sqrt{x} and y = x.$

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82. Find the area of the region $\{(x, y) : x^2 \leq y \leq |x|\}$.

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83. Evaluate $\int \cos 2x + e^x dx$

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84. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$and the line $\frac{x}{a} + \frac{y}{b} = 1$

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85. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 1 \leq x + y\}$.

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86. Find $\frac{dy}{dx}$ if $y = \sin^2 x$

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

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89. Find the area bounded by the curve $4y^2 = 9x$ and $3x^2 = 16y$

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90. Find the area of the region bounded by $y = \sqrt{x} and y = x \cdot$

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91. Find the area bounded by the curves $y = 4 - x^2$ and the lines $y = 0$ and $y = 3$

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92. Find the area of the region $\left\{(x, y) : \frac{x^2}{a^2} + \frac{y^2}{b^2} \leq 1 \leq \frac{x}{a} + \frac{y}{b}\right\}$

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93. Using integration, find the area of the region bounded by the triangle whose vertices are (2,1), (3, 4) and (5,2).

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

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95. Using integration find the area of the triangular region whose sides have equations $y = 2x + 1,\ y = 3x + 1$ and $x = 4$

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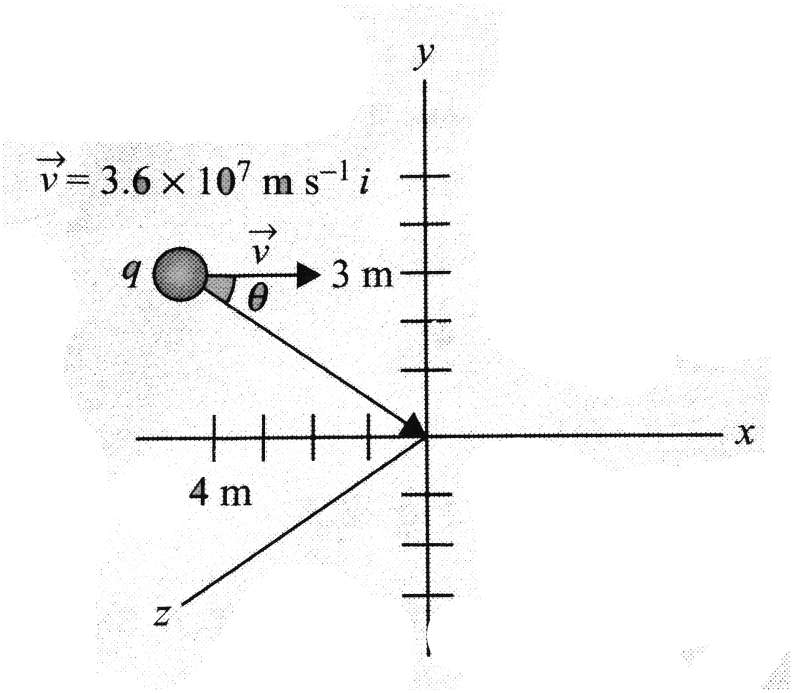
96. A point chanrge of magnitude $q = 4.5nC$ is moving with speed $v = 3.6 \times 10^7 ms^{-1}$ parallel to the x-axis along the line $y = 3m$. Find the magnetic field at the origin produced by this charge when the charge is at the point $x = -4m,\ y = 3m,$ as

shown in Fig.



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97. Find $\dfrac{dy}{dx}$ if $y = \log x + \sin x$

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98. Find $\frac{dy}{dx}$ if $x^2 + y^2 = 16$

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99. Find the area of the region included between the parabola $y^2 = x$ and the line $x + y = 2$.

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100. Draw a rough sketch of the region $\{(x, y) : y^2 \leq 3x, 3x^2 + 3y^2 \leq 16\}$ and find the

area enclosed by the region using the method of integration

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101. Draw a rough sketch of the region $\{(x, y) : y^2 \leq 5x,\ 5x^2 + 5y^2 \leq 36\}$ and find the area enclosed by the region using method of integration

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102. Draw a rough sketch and find the area of the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$, using the method of integration.

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103. Find the area included between the parabolas $y^2 = 4ax$ and $x^2 = 4by$.

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104. Find the area of the region in the first quadrant enclosed by x-axis, line $x = \sqrt{3}y$and the circle $x^2 + y^2 = 4$.

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105. Find the area of the region bounded by $y = \sqrt{x},\ x = 2y + 3$ in the first quadrant and x-axis.

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106. Find the area common to the circle $x^2 + y^2 = 16a^2$ and the parabola $y^2 = 6ax, a > 0.$

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

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108. Find the area enclosed by the parabolas $y = 5x^2 and\, y = 2x^2 + 9.$

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109. The area common to the parabolas $y = 2x^2$ and $y = x^2 + 4$ (in square units) is (A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{32}{3}$ (D) $\frac{3}{32}$

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110. Using integration, find the area of the region bounded by the triangle whose vertices are (-1, 2), (1, 5) and (3, 4).

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111. Find the area of the region in the first quadrant enclosed by x-axis, the line $y = \sqrt{3}\,x$ and the circle $x^2 + y^2 = 16$

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112. Find the area of the region bounded by parabola $y^2 = 2x + 1$ and the line $x - y - 1 = 0$.

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113. Find the area of the region bounded by the curves $y = x - 1$ & $(y - 1)^2 = 4(x + 1)$.

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114. Find the area bounded by the parabola $y = 2 - x^2$ and the straight line $y + x = 0$.

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115. Using the method of integration, find the area of the region bounded by the following lines $3x - y - 3 = 0, 2x + y - 12 = 0, x - 2y - 1 = 0.$

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116. Sketch the region bounded by the curves $y = x^2 + 2,\ y = x,\ x = 0\ and\ x = 1.$ also, find the area of this region.

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117. Find the area bounded by the curves $x = y^2$ and $x = 3 - 2y^2$.

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118. Using integration, find the area of the triangle ABC, coordinates of whose vertices are A(4,1), B(6,6) and C(8,4)

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119. Find the area of the region in the first quadrant enclosed by the y-axis, the line $y = x$ and the circle

$x^2 + y^2 = 32$, using integration.

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120. Find the area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$.

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

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122. Make a rough sketch of the region given below and find its area using integration $\{(x, y): 0 \leq y \leq x^2 + 3, 0 \leq y \leq 2x + 3, 0 \leq x \leq 3\}$.

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123. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 4, \ x + y \geq 2\}$

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124. Using integration, find the area of the following region: $\left\{(x, y): \frac{x^2}{9}+\frac{y^2}{4} \leq 1 \leq \frac{x}{3}+\frac{y}{2}\right\}$.

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125. In what ratio does the x-axis divide the area of the region bounded by the parabolas $y=4x-x^2 and y=x^2-x$?

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126. In what ratio does the x-axis divide the area of the region bounded by the parabolas $y = 4x - x^2 and y = x^2 - x$?

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127. Using integration, find the area bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$.

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128. Sketch the region common to the circle $x^2 + y^2 = 16$ and the parabols $x^2 = 6y$. Also find the area of the region using integration.

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129. Find the area of the region between the parabola $x = 4y - y^2$ and the line $x = 2y - 3$.

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130. Find the area bounded by the parabola $x = 8 + 2y - y^2$; the y-axis and the lines $y = -1$ and $y = 3$.

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131. The area bounded by the parabolay $y^2 = 4x$ and the line $y = 2x - 4$ on the Y-axis.

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132. If the area above x-axis bounded by the curves $y = 2^{kx} and x = 0$ and $x = 2is\frac{3}{(\log)_e 2}$, then find the value of k.

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133. Find the area included between the curves $x^2 = 4y$ and $y^2 = 4x$.

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134. The area bounded by the curve $y = \log_e x$, the x-axis and the line $x = e$ is (A) e sq. units (B) 1 sq. unit (C) $\left(1 - \frac{1}{e}\right)$ sq. units (D) $\left(1 + \frac{1}{e}\right)$ sq. units

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135. The area bounded by the $y = 2 - x^2 and\, x + y = 0$ is (a) $\frac{7}{2} sq\dot{u}nits$ b. $\frac{9}{2}\ sq\dot{u}nits$ c. $9\ sq\dot{u}nits$ d. none of these

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136. The area bounded by the parabola $x = 4 - y^2$ and y-axis, in square units, is $\frac{3}{32}$ b. $\frac{32}{3}$ c. $\frac{33}{2}$ d. $\frac{16}{3}$

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137. If A_n be the area bounded by the curve $y = (\tan x)^n$ and the lines $x = 0,\ y = 0,\ x = \pi/4$, then for $n > 2$.

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138. The area enclosed between the curves $y = (\log)_e(x + e), x = (\log)_e\left(\frac{1}{y}\right),$ and the x-axis is $2sq\grave{u}nits$ (b) $1sq\grave{u}nits$ $4sq\grave{u}nits$ (d) none of these

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139. The area of the figure bounded by the parabola $(y-2)^2 = x - 1,$ the tangent to it at the point with the ordinate $x = 3,$ and the $x - a\xi s$ is $7sq\grave{u}nites$ (b) $6sq\grave{u}nites$ $9sq\grave{u}nites$ (d) None of these

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140. The area bounded by the curves $y = \sin x$ between the ordinates $x = 0,\ x = \pi$ and the x-axis is $2\ sqùnits$ b. $4\ sqùnits$ c. $3\ sqùnits$ d. $1\ sqùnits$

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141. The area bounded by parabola $y^2 = 4ax\ and\ x^2 = 4ay$ is $\frac{8a^3}{3}$ b. $\frac{16a^2}{3}$ c. $\frac{32a^2}{3}$ d. $\frac{64a^2}{3}$

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142. The area bounded by the curve $y = x^4 - 2x^3 + x^2 + 3$ with x-axis and ordinates corresponding to the minima of y, is

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143. The area bounded by the parabola $y^2 = 4ax$, the latusrectum and x-axis is 0 b. $\frac{4}{3}a^2$ c. $\frac{2}{3}a^2$ d. $\frac{a^2}{3}$

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144. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 1 \leq x + y\}$.

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145. The area common to the parabola $y = 2x^2$ and $y = x^2 + 4$ is:

A. (a) $\frac{2}{3}u^2$

B. (b) $\frac{3}{2}u^2$

C. (c) $\frac{32}{3}u^2$

D. (d) $\frac{3}{32}u^2$

Answer: null

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146. Find the area bounded by the parabola $y = x^2 + 1$ and the straight line $x + y = 3$.

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147. Find the angle between the curves $2y^2 = x^3$ and $y^2 = 32x$.

A. (A) $1:3$

B. (B) $2:1$

C. (C) $\sqrt{3}:1$

D. (D) none of these

Answer: null

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148. Area between the x-axis and the curve $y = \cos x$, when $0 \leq x \leq 2\pi$ is:

A. (A) 0

B. (B) 2

C. (C) 3

D. (D) 4

Answer: null

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149. Area bounded by the parabola $y^2 = x$ and the line $2y = x$ is:

A. (A) $\frac{4}{3}$

B. (B) 1

C. (C) $\frac{2}{3}$

D. (D) $\frac{1}{3}$

Answer: null

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150. The area bounded by the curve $y = 4x - x^2$ and the x-axis is:

A. (a) $\frac{30}{7}u^2$

B. (b) $\frac{31}{7}u^2$

C. (c) $\frac{32}{3}u^2$

D. (d) $\frac{34}{3}u^2$

Answer: null

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151. The area enclosed between the curve $y^2(2a - x) = x^3$ and the line x=2a above the x-axis is

A. (a) $\pi a^2 u^2$

B. (b) $\frac{3\pi a^2}{2} u^2$

C. (c) $2\pi a^2 u^2$

D. (d) $3\pi a^2 u^2$

Answer: null

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152. The area of the region (in square units) bounded by the curve $x^2 = 4y$ and the line $x = 2$ and x-axis is:

A. (a) 1

B. (b) $\frac{2}{3}$

C. (c) $\frac{4}{3}$

D. (d) $\frac{8}{3}$

Answer: null

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153. If the area bounded by the curve y=f(x), x-axis and the ordinates x=1 and x=b is (b-1) $\sin(3b+4)$, then find f(x).

A. (a) $(x-1)\cos(3x+4)$

B. (b) $\sin(3x+4)$

C. (c) $\sin(3x+4)+3(x-1)\cos(3x+4)$

D. (d) None of these

Answer: null

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154. The area bounded by the curve $y^2 = 8x \; and \; x^2 = 8y$ is $\frac{16}{3} sq units$ b. $\frac{3}{16} sq units$ c. $\frac{14}{3} sq units$ d. $\frac{3}{14} sq units$

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155. The area bounded by the parabola $y^2 = 8x$, the x-axis and the latus rectum is a. $\frac{16}{3}$ b. $\frac{23}{3}$ c. $\frac{32}{3}$ d. $\frac{16\sqrt{2}}{3}$

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156. Area bounded by the curve $y = x^3$, the x-axis and the ordinates $x = -2$ and $x = 1$ is:

A. (a) -9

B. (b) $\frac{-15}{4}$

C. (c) $\frac{15}{4}$

D. (d) $\frac{17}{4}$

Answer: null

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157. The area bounded by the curve $y = x|x|$, x-axis and the ordinates $x = -1$ & $x = 1$ is:

A. (A) $\frac{5}{3}$

B. (B) $\frac{4}{3}$

C. (C) $\frac{2}{3}$

D. (D) $\frac{1}{3}$

Answer: null

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158. Find the area bounded by the y-axis, $y = \cos x$,and $y = \sin x$ when $0 \leq x \leq \frac{\pi}{2}$.

A. (A) $2\left(\sqrt{2-1}\right)$

B. (B) $\sqrt{2} - 1$

C. (C) $\sqrt{2} + 1$

D. (D) $\sqrt{2}$

Answer: null

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159. The area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$ is :

A. (A) $\frac{4}{3}\left(4\pi - \sqrt{3}\right)$

B. (B) $\frac{4}{3}\left(4\pi + \sqrt{3}\right)$

C. (C) $\frac{4}{3}\left(8\pi - \sqrt{3}\right)$

D. (D) $\frac{4}{3}\left(8\pi + \sqrt{3}\right)$

Answer: null

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160. Smaller area enclosed by the circle $x^2 + y^2 = 4$ and the line $x + y = 2$ is:

A. (A) $2(\pi - 2)$

B. (B) $\pi - 2$

C. (C) $2\pi - 1$

D. (D) $2(\pi + 2)$

Answer: null

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161. Area lying between the curves $y^2 = 4x$ and $y = 2x$ is:

A. (A) $\frac{2}{3}$

B. (B) $\frac{1}{3}$

C. (C) $\frac{1}{4}$

D. (D) $\frac{3}{4}$

Answer: null

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162. Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines $x = 0$ and $x = 2$ is:

A. (A) π

B. (B) $\frac{\pi}{2}$

C. (C) $\frac{\pi}{3}$

D. (D) $\frac{\pi}{4}$

Answer: null

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163. Area of the region bounded by the curve $y^2 = 4x$, y-axis and the line $y = 3$ is (A) 2 (B) $\frac{9}{4}$ (C) $\frac{9}{3}$ (D) $\frac{9}{2}$

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