

Arc Length

Calculate the arc lengths for the given curves and x or y values:

1. $y = 3x + 5$; $x = 1$, $x = 4$ (Ans: $3\sqrt{10}$)
2. $x = 2y - 3$; $y = 0$, $y = 2$ (Ans: $2\sqrt{5}$)
3. $y = 2x^{3/2}$; $x = \frac{1}{3}$, $x = 7$ (Ans: $\frac{112}{3}$)
4. $y = \frac{2}{3}(x^2 + 1)^{3/2}$; $x = 1$, $x = 4$ (Ans: 45)
5. $y = (4 - x^{2/3})^{3/2}$; $x = 1$, $x = 8$ (Ans: 9)
6. $y = (x^4 + 3)/6x$; $x = 1$, $x = 4$ (Ans: $\frac{87}{8}$)
7. $x = \frac{y^4}{16} + \frac{1}{2y^2}$; $y = -2$, $y = -1$ (Ans: $\frac{21}{16}$)
8. $x = \frac{y^5}{30} + \frac{1}{2y^3}$; $y = 1$, $y = 2$ (Ans: $\frac{353}{240}$)
9. $y = x^{3/2}$; $x = 0$, $x = 5$ (Ans: $\frac{335}{27}$)
10. $x = 3y^{3/2} - 1$; $y = 0$, $y = 4$ (Ans: $\frac{8}{243}(82\sqrt{82} - 1)$)
11. $24xy = x^4 + 48$; $x = 2$, $x = 4$ (Ans: $\frac{17}{6}$)
12. $y^3 = 8x^2$; $x = 1$, $x = 8$ (Ans: $(104\sqrt{13} - 125)/27$)
13. $6xy = x^4 + 3$; $x = 1$, $x = 2$ (Ans: $\frac{17}{12}$)

Surface Area of Revolution

Find the surface area of revolution for the following curves between the given x or y values and the given axis:

1. $y = 6x$; $x = 0$, $x = 1$; x -axis (Ans: $6\sqrt{37}\pi$)
2. $x = 6y + 1$; $y = 0$, $y = 2$; y -axis (Ans: $28\sqrt{37}\pi$)
3. $y = \sqrt{25 - x^2}$; $x = -2$, $x = 3$; x -axis (Ans: 50π)
4. $y = x^3/3$; $x = 1$, $x = \sqrt{7}$; x -axis (Ans: $248\sqrt{2}\pi/9$)
5. $x = y^3$; $y = 0$, $y = 1$; y -axis (Ans: $(10\sqrt{10} - 1)\pi/27$)
6. $y = x^2$; $x = 0$, $x = 2\sqrt{3}$; y -axis (Ans: 57π)
7. $y = \frac{1}{2}x^2 - 1$; $x = 0$, $x = 2\sqrt{2}$; y -axis (Ans: $52\pi/3$)
8. $y = (x^6 + 2)/8x^2$; $x = 1$, $x = 3$; x -axis (Ans: $8429\pi/81$)
9. $y^2 = 12x$; $x = 0$, $x = 3$; x -axis (Ans: $24(2\sqrt{2} - 1)\pi$)
10. $x = y^3$; $y = 0$, $y = 1$; y -axis (Ans: $\frac{(10\sqrt{10}-1)\pi}{27}$)
11. $8a^2y^2 = a^2x^2 - x^4$; $x = 0$, $x = 1$; x -axis (Ans: $\pi a^2/4$)
12. $y = mx$; $x = 0$, $x = 2$; x -axis (Ans: $4m\pi\sqrt{1+m^2}$)
13. $y = \frac{1}{3}x^3$; $x = 0$, $x = 3$; x -axis (Ans: $\pi(82\sqrt{82} - 1)/9$)
14. $8y^2 = x^2(1 - x^2)$ above x -axis; $x = 0$, $x = 1$; x -axis (Ans: $\pi/4$)
15. $9y^2 = x(3 - x)^2$ above x -axis; $x = 0$, $x = 3$; y -axis (Ans: $28\pi\sqrt{3}/5$)
16. $y = \sqrt{r^2 - x^2}$; $x = -\frac{1}{2}a$, $x = \frac{1}{2}a$; x -axis (Ans: $2\pi ar$)