

**EXERCISE 8.2**

1.  $\frac{\sqrt{2}}{6} + \frac{9}{4} \sin^{-1} \frac{2\sqrt{2}}{3}$                       2.  $\left( \frac{2\pi}{3} - \frac{\sqrt{3}}{2} \right)$
3.  $\frac{21}{2}$                                       4. 4                                      5. 8
6. B                                      7. B

*Miscellaneous Exercise on Chapter 8*

1. (i)  $\frac{7}{3}$                                       (ii) 624.8
2.  $\frac{1}{6}$                                       3.  $\frac{7}{3}$                                       4. 9                                      5. 4
6.  $\frac{8a^2}{3m^3}$                                       7. 27                                      8.  $\frac{3}{2}(\pi-2)$
9.  $\frac{ab}{4}(\pi-2)$                               10.  $\frac{5}{6}$                                       11. 2                                      12.  $\frac{1}{3}$
13. 7                                      14.  $\frac{7}{2}$                                       15.  $\frac{9\pi}{8} - \frac{9}{4} \sin^{-1} \left( \frac{1}{3} \right) + \frac{1}{3\sqrt{2}}$
16. D                                      17. C                                      18. C                                      19. B

**EXERCISE 9.1**

1. Order 4; Degree not defined                      2. Order 1; Degree 1
3. Order 2; Degree 1                                      4. Order 2; Degree not defined
5. Order 2; Degree 1                                      6. Order 3; Degree 2
7. Order 3; Degree 1                                      8. Order 1; Degree 1
9. Order 2; Degree 1                                      10. Order 2; Degree 1
11. D                                      12. A

**EXERCISE 9.2**

11. D                                      12. D

**EXERCISE 9.3**

1.  $y'' = 0$
2.  $xy y'' + x(y')^2 - y y' = 0$
3.  $y'' - y' - 6y = 0$
4.  $y'' - 4y' + 4y = 0$
5.  $y'' - 2y' + 2y = 0$
6.  $2xyy' + x^2 = y^2$
7.  $xy' - 2y = 0$
8.  $xyy'' + x(y')^2 - yy' = 0$
9.  $xyy'' + x(y')^2 - yy' = 0$
10.  $(x^2 - 9)(y')^2 + x^2 = 0$
11. B
12. C

**EXERCISE 9.4**

1.  $y = 2 \tan \frac{x}{2} - x + C$
2.  $y = 2 \sin(x + C)$
3.  $y = 1 + Ae^{-x}$
4.  $\tan x \tan y = C$
5.  $y = \log(e^x + e^{-x}) + C$
6.  $\tan^{-1} y = x + \frac{x^3}{3} + C$
7.  $y = e^{cx}$
8.  $x^{-4} + y^{-4} = C$
9.  $y = x \sin^{-1} x + \sqrt{1-x^2} + C$
10.  $\tan y = C(1 - e^x)$
11.  $y = \frac{1}{4} \log[(x+1)^2(x^2+1)^3] - \frac{1}{2} \tan^{-1} x + 1$
12.  $y = \frac{1}{2} \log\left(\frac{x^2-1}{x^2}\right) - \frac{1}{2} \log \frac{3}{4}$
13.  $\cos\left(\frac{y-2}{x}\right) = a$
14.  $y = \sec x$
15.  $2y - 1 = e^x(\sin x - \cos x)$
16.  $y - x + 2 = \log(x^2(y+2)^2)$
17.  $y^2 - x^2 = 4$
18.  $(x+4)^2 = y+3$
19.  $(63t+27)^{\frac{1}{3}}$
20. 6.93%
21. Rs 1648
22.  $\frac{2 \log 2}{\log\left(\frac{11}{10}\right)}$
23. A

**EXERCISE 9.5**

1.  $(x-y)^2 = Cx e^{\frac{-y}{x}}$
2.  $y = x \log|x| + Cx$

3.  $\tan^{-1}\left(\frac{y}{x}\right) = \frac{1}{2}\log(x^2 + y^2) + C$       4.  $x^2 + y^2 = Cx$
5.  $\frac{1}{2\sqrt{2}}\log\left|\frac{x+\sqrt{2}y}{x-\sqrt{2}y}\right| = \log|x| + C$       6.  $y + \sqrt{x^2 + y^2} = Cx^2$
7.  $xy \cos\left|\frac{y}{x}\right| = C$       8.  $x\left[1 - \cos\left(\frac{y}{x}\right)\right] = C\sin\left(\frac{y}{x}\right)$
9.  $cy = \log\left|\frac{y}{x}\right| - 1$       10.  $ye^{\frac{x}{y}} + x = C$
11.  $\log(x^2 + y^2) + 2 \tan^{-1}\frac{y}{x} = \frac{\pi}{2} + \log 2$
12.  $y + 2x = 3x^2 y$       13.  $\cot\left(\frac{y}{x}\right) = \log|ex|$
14.  $\cos\left(\frac{y}{x}\right) = \log|ex|$       15.  $y = \frac{2x}{1 - \log|x|} (x \neq 0, x \neq e)$
16. C      17. D

### EXERCISE 9.6

1.  $y = \frac{1}{5}(2\sin x - \cos x) + C e^{-2x}$       2.  $y = e^{-2x} + C e^{-3x}$
3.  $xy = \frac{x^4}{4} + C$       4.  $y(\sec x + \tan x) = \sec x + \tan x - x + C$
5.  $y = (\tan x - 1) + C e^{-\tan x}$       6.  $y = \frac{x^2}{16}(4\log|x| - 1) + Cx^{-2}$
7.  $y \log x = \frac{-2}{x}(1 + \log|x|) + C$       8.  $y = (1+x)^{-1} \log|\sin x| + C(1+x^2)^{-1}$
9.  $y = \frac{1}{x} - \cot x + \frac{C}{x \sin x}$       10.  $(x + y + 1) = C e^y$
11.  $x = \frac{y^2}{3} + \frac{C}{y}$       12.  $x = 3y^2 + Cy$

13.  $y = \cos x - 2 \cos^2 x$       14.  $y(1+x^2) = \tan^{-1} x - \frac{\pi}{4}$   
 15.  $y = 4 \sin^3 x - 2 \sin^2 x$       16.  $x + y + 1 = e^x$   
 17.  $y = 4 - x - 2e^x$       18. C      19. D

### Miscellaneous Exercise on Chapter 9

1. (i) Order 2; Degree 1      (ii) Order 1; Degree 3  
 (iii) Order 4; Degree not defined
3.  $y' = \frac{2y^2 - x^2}{4xy}$       5.  $(x + yy')^2 = (x - y)^2 (1 + (y')^2)$
6.  $\sin^{-1} y + \sin^{-1} x = C$       8.  $\cos y = \frac{\sec x}{\sqrt{2}}$
9.  $\tan^{-1} y + \tan^{-1}(e^x) = \frac{\pi}{2}$       10.  $e^{\frac{x}{y}} = y + C$
11.  $\log |x - y| = x + y + 1$       12.  $ye^{2\sqrt{x}} = (2\sqrt{x} + C)$
13.  $y \sin x = 2x^2 - \frac{\pi^2}{2} (\sin x \neq 0)$       14.  $y = \log \left| \frac{2x+1}{x+1} \right|, x \neq -1$
15. 31250      16. C
17. C      18. C

### EXERCISE 10.1

1. In the adjoining figure, the vector  $\overline{OP}$  represents the required displacement.

