

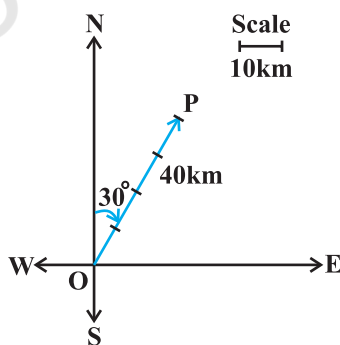
13.  $y = \cos x - 2 \cos^2 x$       14.  $y(1+x^2) = \tan^{-1} x - \frac{\pi}{4}$   
 15.  $y = 4 \sin^3 x - 2 \sin^2 x$       16.  $x + y + 1 = e^x$   
 17.  $y = 4 - x - 2e^x$       18. C      19. D

### 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.



2. (i) scalar (ii) vector (iii) scalar (iv) scalar (v) scalar  
(vi) vector
3. (i) scalar (ii) scalar (iii) vector (iv) vector (v) scalar
4. (i) Vectors  $\vec{a}$  and  $\vec{b}$  are coinitial  
(ii) Vectors  $\vec{b}$  and  $\vec{d}$  are equal  
(iii) Vectors  $\vec{a}$  and  $\vec{c}$  are collinear but not equal
5. (i) True (ii) False (iii) False (iv) False

### EXERCISE 10.2

1.  $|\vec{a}|=\sqrt{3}, |\vec{b}|=\sqrt{62}, |\vec{c}|=1$
2. An infinite number of possible answers.
3. An infinite number of possible answers.
4.  $x = 2, y = 3$
5.  $-7$  and  $6; -7\hat{i}$  and  $6\hat{j}$
6.  $-4\hat{j}-\hat{k}$
7.  $\frac{1}{\sqrt{6}}\hat{i}+\frac{1}{\sqrt{6}}\hat{j}+\frac{2}{\sqrt{6}}\hat{k}$
8.  $\frac{1}{\sqrt{3}}\hat{i}+\frac{1}{\sqrt{3}}\hat{j}+\frac{1}{\sqrt{3}}\hat{k}$
9.  $\frac{1}{\sqrt{2}}\hat{i}+\frac{1}{\sqrt{2}}\hat{k}$
10.  $\frac{40}{\sqrt{30}}\hat{i}-\frac{8}{\sqrt{30}}\hat{j}+\frac{16}{\sqrt{30}}\hat{k}$
12.  $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$
13.  $-\frac{1}{3}, -\frac{2}{3}, \frac{2}{3}$
15. (i)  $-\frac{1}{3}\hat{i}+\frac{4}{3}\hat{j}+\frac{1}{3}\hat{k}$  (ii)  $-3\hat{i}+3\hat{k}$
16.  $3\hat{i}+2\hat{j}+\hat{k}$
18. (C)
19. (B), (C), (D)

### EXERCISE 10.3

1.  $\frac{\pi}{4}$
2.  $\cos^{-1}\left(\frac{5}{7}\right)$
3. 0
4.  $\frac{60}{\sqrt{114}}$
6.  $\frac{16\sqrt{2}}{3\sqrt{7}}, \frac{2\sqrt{2}}{3\sqrt{7}}$
7.  $6|\vec{a}|^2+11\vec{a}\cdot\vec{b}-35|\vec{b}|^2$
8.  $|\vec{a}|=1, |\vec{b}|=1$
9.  $\sqrt{13}$
10. 8

12. Vector  $\vec{b}$  can be any vector
13.  $\frac{-3}{2}$
14. Take any two non-zero perpendicular vectors  $\vec{a}$  and  $\vec{b}$
15.  $\cos^{-1}\left(\frac{10}{\sqrt{102}}\right)$
18. (D)

### EXERCISE 10.4

1.  $19\sqrt{2}$
2.  $\pm\frac{2}{3}\hat{i} \mp \frac{2}{3}\hat{j} \mp \frac{1}{3}\hat{k}$
3.  $\frac{\pi}{3}; \frac{1}{2}, \frac{1}{\sqrt{2}}, \frac{1}{2}$
5.  $3, \frac{27}{2}$
6. Either  $|\vec{a}|=0$  or  $|\vec{b}|=0$
8. No; take any two nonzero collinear vectors
9.  $\frac{\sqrt{61}}{2}$
10.  $15\sqrt{2}$
11. (B)
12. (C)

### Miscellaneous Exercise on Chapter 10

1.  $\frac{\sqrt{3}}{2}\hat{i} + \frac{1}{2}\hat{j}$
2.  $x_2 - x_1, y_2 - y_1, z_2 - z_1; \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$
3.  $\frac{-5}{2}\hat{i} + \frac{3\sqrt{3}}{2}\hat{j}$
4. No; take  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  to represent the sides of a triangle.
5.  $\pm\frac{1}{\sqrt{3}}$
6.  $\frac{3}{2}\sqrt{10}\hat{i} + \frac{\sqrt{10}}{2}\hat{j}$
7.  $\frac{3}{\sqrt{22}}\hat{i} - \frac{3}{\sqrt{22}}\hat{j} + \frac{2}{\sqrt{22}}\hat{k}$
8. 2 : 3
9.  $3\vec{a} + 5\vec{b}$
10.  $\frac{1}{7}(3\hat{i} - 6\hat{j} + 2\hat{k}); 11\sqrt{5}$
12.  $\frac{1}{3}(160\hat{i} - 5\hat{j} + 70\hat{k})$
13.  $\lambda = 1$
16. (B)
17. (D)
18. (C)
19. (B)