

Vectors 1- Answers

1. (a) $(2, 3, 0)$ (b) $(17, -4, -1)$
(c) $(0, 1, 0)$ (d) (x, y, z)
2. $\mathbf{A} = 3\mathbf{i} - \mathbf{j} - 2\mathbf{k}$; $\mathbf{B} = 7\mathbf{k}$.
3. (a) $\sqrt{13}$ (b) $\sqrt{306}$
(c) 1 (d) $\sqrt{x^2 + y^2 + z^2}$
4. If $\mathbf{p} = 4\mathbf{i} + 2\mathbf{j}$ and $\mathbf{q} = -\mathbf{i} + 3\mathbf{k}$, find the vectors
(a) $-4\mathbf{i} - 2\mathbf{j}$ (b) $-2\mathbf{i} + 6\mathbf{k}$ (c) $3\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$
(d) $17\mathbf{i} + 6\mathbf{j} - 15\mathbf{k}$
5. (a) $\frac{-2\mathbf{i} - \mathbf{j}}{\sqrt{5}} \equiv -\frac{2}{\sqrt{5}}\mathbf{i} - \frac{1}{\sqrt{5}}\mathbf{j}$ (b) $\frac{-\mathbf{i} + 3\mathbf{k}}{\sqrt{10}} \equiv \frac{-1}{\sqrt{10}}\mathbf{i} + \frac{3}{\sqrt{10}}\mathbf{k}$
(c) $\frac{3\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}}{\sqrt{22}}$ (d) $\frac{17\mathbf{i} + 6\mathbf{j} - 15\mathbf{k}}{\sqrt{550}}$
6. (a) $\mathbf{i} + 4\mathbf{j}$ (b) $-\mathbf{i} - 4\mathbf{j}$ (c) $\sqrt{17}$
(d) $(2\mathbf{i} + \mathbf{j}) + \frac{\mathbf{i} + 4\mathbf{j}}{2} = 2.5\mathbf{i} + 3\mathbf{j}$
7. $\tan^{-1}(5/3) = 1.030\text{rad} = 59.04^\circ$.
8. (a) \mathbf{a} $-\mathbf{b}$ $\mathbf{a} + \mathbf{b}$ $\mathbf{a} - \mathbf{b}$.
(b) $\frac{1}{2}(\mathbf{a} + \mathbf{b})$ $\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b}) = \frac{1}{2}(\mathbf{a} + \mathbf{b})$
(c) The diagonals of a parallelogram bisect one another.