22. $\mathbf{a} + \mathbf{b} = (8 + 5, 1 + (-2), -4 + 1) = (13, -1, -3)$

$4\mathbf{a} + 2\mathbf{b} = 4(8, 1, -4) + 2(5, -2, 1) = (32, 4, -16) + (10, -4, 2) = (42, 0, -14)$

$|\mathbf{a}| = \sqrt{8^2 + 1^2 + (-4)^2} = \sqrt{81} = 9$

$|\mathbf{a} - \mathbf{b}| = |(8 - 5, 1 - (-2), -4 - 1)| = |(3, 3, -5)| = \sqrt{3^2 + 3^2 + (-5)^2} = \sqrt{43}$

23. The vector $(6, -2)$ has length $|(6, -2)| = \sqrt{6^2 + (-2)^2} = \sqrt{40} = 2\sqrt{10}$, so by Equation 4 the unit vector with the same direction is $\frac{1}{2\sqrt{10}} (6, -2) = \left( \frac{3}{\sqrt{10}}, -\frac{1}{\sqrt{10}} \right)$.

24. The vector $-5 \mathbf{i} + 3 \mathbf{j} - \mathbf{k}$ has length $|-5 \mathbf{i} + 3 \mathbf{j} - \mathbf{k}| = \sqrt{(-5)^2 + 3^2 + (-1)^2} = \sqrt{35}$, so by Equation 4 the unit vector with the same direction is $\frac{1}{\sqrt{35}} (-5 \mathbf{i} + 3 \mathbf{j} - \mathbf{k}) = \left( -\frac{5}{\sqrt{35}}, \frac{3}{\sqrt{35}}, -\frac{1}{\sqrt{35}} \right)$.

25. The vector $8 \mathbf{i} - \mathbf{j} + 4 \mathbf{k}$ has length $|8 \mathbf{i} - \mathbf{j} + 4 \mathbf{k}| = \sqrt{8^2 + (-1)^2 + 4^2} = \sqrt{81} = 9$, so by Equation 4 the unit vector with the same direction is $\frac{1}{9} (8 \mathbf{i} - \mathbf{j} + 4 \mathbf{k}) = \left( \frac{8}{9}, -\frac{1}{9}, \frac{4}{9} \right)$.

26. $|(6, 2, -3)| = \sqrt{6^2 + 2^2 + (-3)^2} = \sqrt{49} = 7$, so a unit vector in the direction of $(6, 2, -3)$ is $\mathbf{u} = \frac{1}{7} (6, 2, -3)$.

A vector in the same direction but with length 4 is $4\mathbf{u} = 4 \cdot \frac{1}{7} (6, 2, -3) = \left( \frac{24}{7}, \frac{8}{7}, -\frac{12}{7} \right)$.