Ex*.1-1, *Prob*.3-35** (HRW,8e) ***Sol.

We apply Eq. 3-30 and Eq. 3-23. If a vector-capable calculator is used, this makes a good exercise for getting familiar with those features. Here we briefly sketch the method.

(**a**) We note that $\boldsymbol{b}\times\boldsymbol{c} = -8.0\,\mathbf{i} + 5.0\,\mathbf{j} + 6.0\,\mathbf{k}$. Thus,

$\boldsymbol{a}\cdot\boldsymbol{b}\times\boldsymbol{c} = (3.0)(-8.0) + (3.0)(5.0) + (-2.0)(6.0) = -21$.

(**b**) We note that $\boldsymbol{b} + \boldsymbol{c} = 1.0\,\mathbf{i} - 2.0\,\mathbf{j} + 3.0\,\mathbf{k}$. Thus,

$\boldsymbol{a}\cdot(\boldsymbol{b}+\boldsymbol{c}) = (3.0)(1.0) + (3.0)(-2.0) + (-2.0)(3.0) = -9.0$.

(**c**) Finally, $\boldsymbol{a}\times(\boldsymbol{b}+\boldsymbol{c}) = [(3.0)(3.0) - (-2.0)(-2.0)]\,\mathbf{i}$
$+ [(-2.0)(1.0) - (3.0)(3.0)]\,\mathbf{j}$
$+ [(3.0)(-2.0) - (1.0)(3.0)]\,\mathbf{k} = 5.0\,\mathbf{i} + -11\,\mathbf{j} - 9.0\,\mathbf{k}$.

Ex*.1-2, *Prob*.3-38** (HRW,8e) ***Sol.

The displacement vectors can be written as

$\boldsymbol{d}_1 = (4.50\text{ m})(\cos 63°\,\mathbf{j} + \sin 63°\,\mathbf{k})$
$= (2.042\text{ m}\,\mathbf{j} + 4.009\text{ m}\,\mathbf{k})$,
$\boldsymbol{d}_2 = (1.40\text{ m})(\cos 30°\,\mathbf{i} + \sin 30°\,\mathbf{k})$
$= (1.212\text{ m}\,\mathbf{i} + 0.700\text{ m}\,\mathbf{k})$.

(**a**) The dot product of $\boldsymbol{d}_1$ and $\boldsymbol{d}_2$ is

$\boldsymbol{d}_1\cdot\boldsymbol{d}_2 = (2.042\,\mathbf{j} + 4.009\,\mathbf{k})\cdot(1.212\,\mathbf{i} + 0.700\,\mathbf{k})$
$= (4.009\,\mathbf{k})\cdot(0.700\,\mathbf{k}) = 2.806 = 2.81\ (\text{m}^2)$ or

Ans. 2.81 m^2.

(**b**) The cross product of $\boldsymbol{d}_1$ and $\boldsymbol{d}_2$ is

$\boldsymbol{d}_1\times\boldsymbol{d}_2 = (2.042\,\mathbf{j} + 4.009\,\mathbf{k})\times(1.212\,\mathbf{i} + 0.700\,\mathbf{k})$
$= (2.042)\times(1.212)(-\mathbf{k}) + (2.042)\times(0.700)\,\mathbf{i} +$
$(4.009)(1.212)\,\mathbf{j} = (1.429\,\mathbf{i} + 4.858\,\mathbf{j} - 2.474\,\mathbf{k})$
$= (1.43\,\mathbf{i} + 4.86\,\mathbf{j} - 2.47\,\mathbf{k})\ (\text{m}^2)$ or

Ans. $(1.43\,\mathbf{i} + 4.86\,\mathbf{j} - 2.47\,\mathbf{k})\text{ m}^2$.

(**c**) The magnitudes of $\boldsymbol{d}_1$ and $\boldsymbol{d}_2$ are

$|\boldsymbol{d}_1|^2 = 20.24$, $|\boldsymbol{d}_1| = 4.500$, $|\boldsymbol{d}_2|^2 = 1.959$, $|\boldsymbol{d}_2| = 1.400$,

Thus, the angle between the two vectors is

$\theta = \cos^{-1}[\boldsymbol{d}_1\cdot\boldsymbol{d}_2 / (d_1 d_2|)]$
$= \cos^{-1}[2.806 / (4.500\times 1.400)] = \cos^{-1}(0.4454)$
$= 63.55° \approx 63.6°$.