SAT PREP
Cross or Vector Product

This is only to help you remember, in case you've seen determinants of 3×3 matrices:

$$\begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix} = \mathbf{i}\begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix} - \mathbf{j}\begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix} + \mathbf{k}\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}$$

$$= (a_2b_3 - b_2a_3)\mathbf{i} - (b_3a_1 - a_3b_1)\mathbf{j} + (a_1b_2 - b_1a_2)\mathbf{k}$$

$$= \mathbf{a} \times \mathbf{b}$$

Find the cross product of the given vectors.

1) $\overrightarrow{TX} \times \overrightarrow{YZ}$
Given: $T = (-4, -5, 2)$ $X = (-6, 8, 8)$
$Y = (1, -3, 1)$ $Z = (-3, -8, 0)$

2) $\overrightarrow{PQ} \times \overrightarrow{RS}$
Given: $P = (6, -5, 8)$ $Q = (2, -9, 5)$
$R = (-2, -6, 8)$ $S = (8, -7, -8)$

3) $\overrightarrow{PQ} \times \overrightarrow{RS}$
Given: $P = (6, 8, -9)$ $Q = (5, -2, -6)$
$R = (-7, -8, -1)$ $S = (9, -4, 6)$

4) $\overrightarrow{TX} \times \overrightarrow{YZ}$
Given: $T = (1, -3, 1)$ $X = (9, -4, 6)$
$Y = (-3, -8, 0)$ $Z = (-2, -5, -6)$

Find a vector that is perpendicular to the given vectors.

5) $\overrightarrow{RS}$ and $\overrightarrow{RT}$
Given: $R = (1, 1, 7)$ $S = (5, 6, -9)$
$T = (-4, -3, 4)$

6) $\overrightarrow{AB}$ and $\overrightarrow{AC}$
Given: $A = (-2, -1, 2)$ $B = (6, -7, 0)$
$C = (-6, 1, 5)$

7) $\overrightarrow{XY}$ and $\overrightarrow{XZ}$
Given: $X = (3, -5, 9)$ $Y = (8, 6, 8)$
$Z = (6, 1, -2)$

8) $\overrightarrow{AB}$ and $\overrightarrow{AC}$
Given: $A = (1, 1, 7)$ $B = (2, 2, -7)$
$C = (7, 5, 0)$

Answer

1) $\langle 17, -26, 62\rangle$
2) $\langle 61, -94, 44\rangle$
3) $\langle -82, 55, 156\rangle$
4) $\langle -9, 53, 25\rangle$
5) $\langle -79, 92, 9\rangle$
6) $\langle -14, -16, -8\rangle$
7) $\langle 115, -52, 3\rangle$
8) $\langle 49, -77, -2\rangle$