

## Assignment: Cross product and Applications

Date \_\_\_\_\_

**Find the cross product of the given vectors.**

1)  $\overrightarrow{PQ} \times \overrightarrow{RS}$

Given:  $P = (-2, 5, -7)$   $Q = (-3, -5, -2)$   
 $R = (-8, -6, -3)$   $S = (5, 9, -1)$

2)  $\overrightarrow{PQ} \times \overrightarrow{RS}$

Given:  $P = (-1, 4, 1)$   $Q = (-4, -3, 4)$   
 $R = (-2, 6, -3)$   $S = (-8, 3, 4)$

**Find a vector that is perpendicular to the given vectors.**

3)  $\overrightarrow{DP}$  and  $\overrightarrow{DQ}$

Given:  $D = (-3, 4, 8)$   $P = (2, -2, 4)$   
 $Q = (0, -7, 5)$

4)  $\overrightarrow{XY}$  and  $\overrightarrow{XZ}$

Given:  $X = (4, 9, 5)$   $Y = (5, 3, 6)$   
 $Z = (-9, -9, -4)$

**Find the area of a triangle with the given vertices.**

5)  $A = (-6, 8, -3)$   
 $B = (-3, 5, 7)$   
 $C = (6, -9, -4)$

6)  $X = (3, -2, 8)$   
 $Y = (4, 3, -9)$   
 $Z = (1, 0, 4)$

**Find the area of a parallelogram with the given vectors as two adjacent sides.**

7)  $\overrightarrow{AB}$  and  $\overrightarrow{AC}$

Given:  $A = (-4, 3, -7)$   $B = (8, -9, 6)$   
 $C = (2, 9, 2)$

8)  $\overrightarrow{AB}$  and  $\overrightarrow{AC}$

Given:  $A = (-5, -1, 1)$   $B = (1, -9, -4)$   
 $C = (5, 7, 6)$

**Find the volume of a parallelepiped with the given vectors as adjacent edges.**

9)  $\overrightarrow{TX}$ ,  $\overrightarrow{TY}$ , and  $\overrightarrow{TZ}$

Given:  $T = (-8, 1, -5)$   $X = (2, -3, -3)$   
 $Y = (-3, 9, -4)$   $Z = (1, -6, -2)$

10)  $\overrightarrow{PQ}$ ,  $\overrightarrow{PR}$ , and  $\overrightarrow{PS}$

Given:  $P = (-1, -8, -1)$   $Q = (7, -6, -8)$   
 $R = (8, 9, 3)$   $S = (-5, 5, 0)$

## Answers to Assignment: Cross product and Applications

- 1)  $-95\mathbf{i} + 67\mathbf{j} + 115\mathbf{k}$     2)  $-40\mathbf{i} + 3\mathbf{j} - 33\mathbf{k}$     3)  $26\mathbf{i} - 3\mathbf{j} + 37\mathbf{k}$     4)  $72\mathbf{i} - 4\mathbf{j} - 96\mathbf{k}$   
5)  $\frac{\sqrt{45283}}{2} \approx 106.399 \text{ units}^2$     6)  $\sqrt{446} \approx 21.119 \text{ units}^2$     7)  $6\sqrt{1562} \approx 237.133 \text{ units}^2$   
8)  $16\sqrt{89} \approx 150.944 \text{ units}^2$     9)  $120 \text{ units}^3$     10)  $1625 \text{ units}^3$

