

1. Determine the angle between the vectors: (you can use a calculator)

(a) $\langle 4, 3 \rangle$ and $\langle -4, 2 \rangle$

(b) $\langle -3, 2 \rangle$ and $\langle -8, -12 \rangle$

(c) $\langle 5, 4 \rangle$ and $\langle 1, 9 \rangle$

(d) $\langle 2, 1, 8 \rangle$ and $\langle 1, -3, 2 \rangle$

2. Determine the unit vector in the direction of:

(a) $\langle 5, -12 \rangle$

(b) $-3\vec{i} + 5\vec{j} + 8\vec{k}$

3. Determine the scalar and vector projection of \vec{F} onto \vec{d} if:
 $\vec{F} = \langle 1, 8 \rangle$ and $\vec{d} = \langle 12, 5 \rangle$

4. Determine the cross product of the vectors:

(a) $\langle 3, 5, -1 \rangle$ and $\langle -2, -3, 4 \rangle$

(b) $\langle 0, 5, 8 \rangle$ and $\langle 4, 0, -2 \rangle$

5. Determine the area of the parallelogram formed by the vectors $\vec{a} = \langle 5, 2 \rangle$ and $\vec{b} = \langle -1, 7 \rangle$.

6. Determine the area of the parallelogram formed by the vectors $\vec{a} = \langle 4, 5, 8 \rangle$ and $\vec{b} = \langle 1, -4, 5 \rangle$.

7. Determine the volume of the parallelepiped formed by the vectors $\vec{a} = \langle 3, -4, 1 \rangle$, $\vec{b} = \langle 5, 2, 4 \rangle$, and $\vec{c} = \langle -1, 3, 3 \rangle$.

8. Determine the equation of the plane determined by the vectors $\vec{v} = \langle 2, -1, 4 \rangle$ and $\vec{w} = \langle 6, 3, 1 \rangle$ and passes through the point $P(3, -2, 2)$.

9. Determine the equation of the plane passing through the points $P(1, 2, -4)$, $Q(0, 3, 7)$ and $R(2, -2, 1)$.