Equations of Planes

For problems 1 – 5 write down the equation of the plane.

1. The plane containing the points \((6, -3, 1), (5, -4, 1)\) and \((3, -4, 0)\).

2. The plane containing the point \((1, -5, 8)\) and orthogonal to the line given by \(x = -3 + 15t, y = 14 - t, z = 9 - 3t\).

3. The plane containing the point \((-8, 3, 7)\) and parallel to the plane given by \(4x + 8y - 2z = 45\).

4. The plane containing the point \((2, 0, -8)\) and containing the line given by \(\vec{r}(t) = \langle 8t, -1 - 5t, 4 - t \rangle\).

5. The plane containing the two lines given by \(\vec{r}(t) = \langle 7 + 5t, 2 + t, 6t \rangle\) and \(\vec{r}(t) = \langle 7 - 6t, 2 - 2t, 10t \rangle\).

For problems 6 – 8 determine if the two planes are parallel, orthogonal or neither.

6. The plane given by \(-5x + 3y + 2z = -8\) and the plane given by \(6x - 8z = 15\).

7. The plane given by \(3x + 9y + 7z = -1\) and the plane containing the points \((1, -1, 9), (4, -1, 2)\) and \((-2, 3, 4)\).

8. The plane given by \(-x - 8y + 3z = 6\) and the plane given by \(2x + 2y + 6z = -91\).

For problems 9 – 11 determine where the line intersects the plane or show that it does not intersect the plane.

9. The line given by \(\vec{r}(t) = \langle 9 + t, -4 + t, 2 + 5t \rangle\) and the plane given by \(4x - 9y + z = 6\).

10. The line given by \(\vec{r}(t) = \langle 2 - 3t, 1 + t, -4 - 2t \rangle\) and the plane given by \(x - 7y - 4z = -1\).
11. The line given by $x = 8, y = -9t, z = 1 + 10t$ and the plane given by $8x + 9y + 2z = 17$.

For problems 12 & 13 find the line of intersection of the two planes.

12. Find the line of intersection of the plane given by $4x + y + 10z = -2$ and the plane given by $-8x + 2y + 3z = -8$.

13. Find the line of intersection of the plane given by $x - 10y - 2z = 3$ and the plane given by $2x - y + z = -13$.

14. Determine if the line given by $x = 4 + 3t, y = -2, z = 1 + 6t$ and the plane given by $8x - y + 4z = -3$ are parallel, orthogonal or neither.