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## Mathematics: Perpendicular Line Formula, Solved Examples 1,2

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### Perpendicular Line Formula

A perpendicular line is a straight line through a point. It makes an angle of  $90^\circ$  with a particular point through which the line passes. Coordinates and line equation is the prerequisite to finding out the perpendicular line.

Consider the equation of the line is  $ax + by + c = 0$  and coordinates are  $(x_1, y_1)$ , the slope should be  $-\frac{a}{b}$ . If one line is perpendicular to this line, the product of slope should be  $-1$ . Let  $m_1$  and  $m_2$  be the slopes of two lines, then if they are perpendicular to each other.

### Solved Examples

**Question 1:** Check whether  $2x + 3y + 5 = 0$  and  $3x - 2y + 1 = 0$  are perpendicular or not?

**Solution:**

The given equations of lines are,  $2x + 3y + 5 = 0$  and  $3x - 2y + 1 = 0$

To check whether they are perpendicular to each other, find out the slopes of both lines. If the product of the slope is  $-1$ , these lines are perpendicular to each other.

Slope equation is;  $m = -\frac{a}{b}$

Slope for first line,  $m_1 = -\frac{a}{b} = -\frac{2}{3}$

Slope for second line,  $m_2 = -\frac{a}{b} = -\frac{3}{-2} = \frac{3}{2}$

So,  $m_1 \times m_2 = -\frac{2}{3} \times \frac{3}{2} = -1$

Since the product of slope is  $-1$ , the given lines are perpendicular to each other.

**Question 2:** Check whether  $3x + 5y + 6 = 0$  and  $5x - 6y + 2 = 0$  are perpendicular or not?

**Solution:** The given equations of lines are,  $3x + 5y + 6 = 0$  and  $5x - 6y + 2 = 0$

To check whether they are perpendicular to each other, find out the slopes of both lines. If the product of the slope is  $-1$ , these lines are perpendicular to each other.

Slope equation is;  $m = -\frac{a}{b}$

Slope for first line,  $m_1 = -\frac{a}{b} = -\frac{3}{5}$

Slope for second line,  $m_2 = -\frac{a}{b} = -\frac{5}{-6} =$

$$\text{So, } m_1 \times m_2 = -\frac{3}{5} \times \frac{5}{6} = -\frac{1}{2}$$

Since the product of slope is not  $-1$  , the given lines are not perpendicular to each other.