

Lesson 7: Equations for Lines Using Normal Segments

Classwork

Opening Exercise

The equations given are in standard form. Put each equation in slope-intercept form. State the slope and the y -intercept.

1. $6x + 3y = 12$

2. $5x + 7y = 14$

3. $2x - 5y = -7$

Example

Given $A(5, -7)$ and $B(8, 2)$:

a. Find an equation for the line through A and perpendicular to \overline{AB} .

b. Find an equation for the line through B and perpendicular to \overline{AB} .

Exercises

- Given $U(-4, -1)$ and $V(7, 1)$:
 - Write an equation for the line through U and perpendicular to \overline{UV} .
 - Write an equation for the line through V and perpendicular to \overline{UV} .
- Given $S(5, -4)$ and $T(-8, 12)$:
 - Write an equation for the line through S and perpendicular to \overline{ST} .
 - Write an equation for the line through T and perpendicular to \overline{ST} .

Closing

Describe the characteristics of a normal segment.

Every equation of a line through a given point (a, b) has the form $A(x - a) + B(y - b) = 0$. Explain how the values of A and B are obtained.

Problem Set

- Given points $C(-4,3)$ and $D(3,3)$:
 - Write the equation of the line through C and perpendicular to \overline{CD} .
 - Write the equation of the line through D and perpendicular to \overline{CD} .
- Given points $N(7,6)$ and $M(7,-2)$:
 - Write the equation of the line through M and perpendicular to \overline{MN} .
 - Write the equation of the line through N and perpendicular to \overline{MN} .
- The equation of a line is given by the equation $8(x - 4) + 3(y + 2) = 0$.
 - What are the coordinates of the image of the endpoint of the normal segment that does not lie on the line? Explain your answer.
 - What translation occurred to move the point of perpendicularity to the origin?
 - What were the coordinates of the original point of perpendicularity? Explain your answer.
 - What were the endpoints of the original normal segment?
- A coach is laying out lanes for a race. The lanes are perpendicular to a segment of the track such that one endpoint of the segment is $(2,50)$, and the other is $(20,65)$. What are the equations of the lines through the endpoints?