DAY 6

Performance Objectives:

➢ Given the equation of a line in slope-intercept, standard, or point-slope form, students will be able to recognize and/or solve for the slope of the line and recall that perpendicular lines have opposite reciprocal slopes 4 out of 5 times.

➢ Given a point that lies on the line and the slope of the line, students will be able to substitute the values appropriately into slope-intercept form and solve the resulting equation for the y-intercept 4 out of 5 times.

➢ Given the slope and the y-intercept, students will be able to substitute the values into slope-intercept form of the equation of a line 5 out of 5 times.

Resources or Materials Needed

Materials:

✓ Answers for the homework due today: *Homework-Day 5* (See Appendix Z)

✓ PowerPoint about writing an equation of a line perpendicular to another line (given in various forms): *Presentation-Day 6* (See Appendix AA)

✓ Copies of tonight's homework assignment: *Homework-Day 6* (See Appendix BB)

Resources:

✓ Projector

✓ Computer with access to Microsoft Office: PowerPoint

✓ Whiteboard with markers and eraser

✓ Wi-Fi

✓ Each student will need an internet enabled device to use the Desmos Scientific Calculator. Link: https://www.desmos.com/scientific

Time: 45 minutes.

Step 1: Pre-Instructional Activities: Students will complete a couple of review problems and then there will be one problem as a preview of today's lesson.

Step 2: Content Presentation: Students take notes while teacher presents the PowerPoint which includes both the step-by-step procedure how to write the equation of a line (in slope-intercept form) perpendicular to another line (given in various forms) and examples in the pattern of "I do, We do, You do."

The steps are as follows (they are almost identical to the parallel to… steps):

1) Get slope. Perpendicular Lines have slopes that are opposite reciprocals. (Change the sign, switch numerator and denominator).

a. If the line given is in slope-intercept form or point slope form, identify the slope from the equation. Then take the opposite reciprocal.

b. If line given is in standard form, convert it to slope-intercept form and identify the slope. Then take the opposite reciprocal.

2) Find the y-intercept. Now that you have the slope of the new line, you need to calculate the exact y-intercept that fits within the specific parameters given.

a. If you are given a point that the parallel line passes through, substitute the ordered pair and the slope in to the appropriate places in slope-intercept form and solve for "b" (the y-intercept).

b. If you are given another line and are told that the new line has the same y-intercept as it then:

      i. If in slope-intercept form, simply identify the y-intercept.

      ii. If in point-slope or standard form, convert to slope-intercept form and then identify the y-intercept.
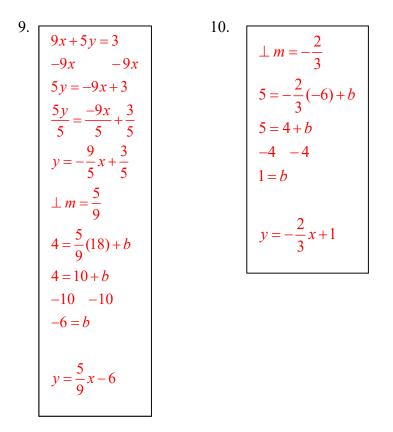
3) Write the equation of your perpendicular line in slope-intercept form, making sure you are using the slope and y-intercept that you found during these steps.
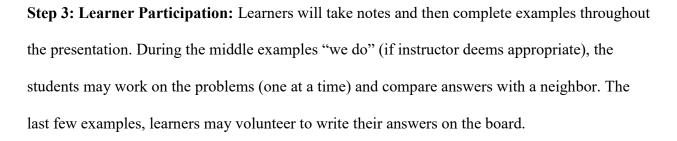
Now it's time to see these steps in action by working through examples in the presentation together. There are a few of each "type" of scenario, so students can see how to solve. As the teacher continues, gauge how the students are doing. Remind students that they can use their Desmos Scientific Calculator as a tool to help them!

If they seem to be understanding, allow them to work through the examples (one at a time) independently, compare their answer with a neighbor, and make any corrections necessary before the teacher models the correct answer on the board (including all supporting work in an organized fashion.)

Answers to examples in the PowerPoint presentation:

1.
$$\perp m = -8$$
$$-5 = -8(1) + b$$
$$-5 = -8 + b$$
$$+8 \quad +8$$
$$3 = b$$

$$y = -8x + 3$$

2.
$$\perp m = 3$$
$$6 = 3(7) + b$$
$$6 = 21 + b$$
$$-21 \quad -21$$
$$-15 = b$$

$$y = -3x - 15$$

3.
$$5x - y = -4$$
$$-5x \qquad -5x$$
$$-y = -5x - 4$$
$$\frac{-y}{-1} = \frac{5x}{-1} - \frac{4}{-1}$$
$$y = -5x + 4$$
$$\perp m = \frac{1}{5}$$
$$-2 = \frac{1}{5}(3) + b$$
$$-2 = \frac{3}{5} + b$$
$$-\frac{3}{5} \quad -\frac{3}{5}$$
$$-\frac{10}{5} - \frac{3}{5} = b$$
$$-\frac{13}{5} = b$$

$$y = \frac{1}{5}x - \frac{13}{5}$$

4.
$$\perp m = -\frac{9}{5}$$
$$5 = -\frac{9}{5}(-5) + b$$
$$5 = 9 + b$$
$$-9 \quad -9$$
$$-4 = b$$

$$y = -\frac{9}{5}x - 4$$

5.
$$\perp m = \frac{1}{2}$$
$$4 = \frac{1}{2}(3) + b$$
$$4 = \frac{3}{2} + b$$
$$-\frac{3}{2} \quad -\frac{3}{2}$$
$$\frac{8}{2} - \frac{3}{2} = b$$
$$\frac{5}{2} = b$$

$$y = \frac{1}{2}x + \frac{5}{2}$$

6.
$$2x + 3y = 12$$
$$-2x \qquad -2x$$
$$3y = -2x + 12$$
$$\frac{3y}{3} = \frac{-2x}{3} + \frac{12}{3}$$
$$y = -\frac{2}{3}x + 4$$
$$\perp m = \frac{3}{2}$$
$$6 = \frac{3}{2}(2) + b$$
$$6 = 3 + b$$
$$-3 \quad -3$$
$$3 = b$$

$$y = \frac{3}{2}x + 3$$

7.
$$\perp m = \frac{6}{5}$$
$$-4 = \frac{6}{5}(10) + b$$
$$-4 = 12 + b$$
$$-12 \quad -12$$
$$-16 = b$$

$$y = \frac{6}{5}x - 16$$

8.
$$\perp m = -1$$
$$-1 = -1(4) + b$$
$$-1 = -4 + b$$
$$-4 \quad -4$$
$$-5 = b$$

$$y = -x - 5$$

9.

$$9x + 5y = 3$$
$$-9x \qquad -9x$$
$$5y = -9x + 3$$
$$\frac{5y}{5} = \frac{-9x}{5} + \frac{3}{5}$$
$$y = -\frac{9}{5}x + \frac{3}{5}$$
$$\perp m = \frac{5}{9}$$
$$4 = \frac{5}{9}(18) + b$$
$$4 = 10 + b$$
$$-10 \quad -10$$
$$-6 = b$$

$$y = \frac{5}{9}x - 6$$

10.

$$\perp m = -\frac{2}{3}$$
$$5 = -\frac{2}{3}(-6) + b$$
$$5 = 4 + b$$
$$-4 \quad -4$$
$$1 = b$$

$$y = -\frac{2}{3}x + 1$$

Step 3: Learner Participation: Learners will take notes and then complete examples throughout the presentation. During the middle examples "we do" (if instructor deems appropriate), the students may work on the problems (one at a time) and compare answers with a neighbor. The last few examples, learners may volunteer to write their answers on the board.

Step 4: Assessment: Review problems at beginning of class, working examples during the main presentation of content, and tonight's independent practice (homework assignment). In addition to questions about this content on summative assessments.

Step 5: Follow-Through Activities: The next two classes will focus on practicing these skills in either whole class practice, independent practice, partner practice, or stations. In addition to including these types of problems as future "Do-Nows" so learners continue to practice.