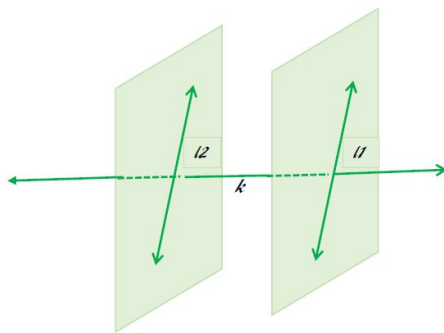


SchoolNova, Math 5c
Homework 18
Parallel and Perpendicular Lines
April 15, 2018

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a *. If unable to solve a problem, please present your thoughts and any partial solution.

In this homework, please use graph paper for drawing on the coordinate plane.

1. It is given that $l_1 \perp k$ and $l_2 \perp k$. A student reasons that lines l_1 and l_2 must be parallel. What is wrong with the reasoning? Sketch a counterexample to support your answer.



2. Given two points $P_1(3, 4)$ and $P_2(7, 2)$ in a coordinate plane, find the distance between them, using the **distance formula**. The distance between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ is given by $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
3. Find the slope of the line that passes through the points $P_1(0, 6)$ and $P_2(5, 2)$. The **slope** of a line through points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ is given by

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

4. Find the slope of the line that passes through the points $P_1(0, 0)$ and $P_2(3, 4)$.
5. Line l_1 passes through the points $(1, 1)$ and $(3, 5)$. Line l_2 passes through the points $(1, 1)$ and $(3, 5)$. Draw both lines on the coordinate plane. Calculate the slopes of both lines. Are the two lines parallel?
6. Write the equation of the line which passes through a point $(2, 3)$ and has a slope of 5, in the **slope-intercept form**. The slope-intercept form of a line with slope m and y-intercept b is given by:

$$y = mx + b$$

7. (a) Find the equation of a line l_1 which passes through points $P_1(3, 1)$ and $P_2(0, 7)$, in the slope-intercept form.
- (b) Find a line l_2 that is parallel to l_1 and passes through the point $P_3(4, 2)$.
- (c) Draw both lines on the coordinate plane.
8. (a) Given below are the equations of two lines l_1 and l_2 . Determine if the two lines are perpendicular. (Two lines are perpendicular if the product of their slopes is -1 .)

$$l_1 : y = 2x + 3$$

$$l_2 : y = \frac{-1}{2}x + 4$$

- (b) Draw both lines on the coordinate plane.

9. Given below are the equations of two lines j_1 and j_2 . Determine if the two lines are perpendicular.

$$j_1 : y = \frac{3}{4}x + 2$$

$$j_2 : y = \frac{-4}{3}x - 2$$

10. * Given below are the equations of two lines k_1 and k_2 . Determine if the two lines are perpendicular.

$$k_1 : 4x + 5y = 2$$

$$k_2 : 5x + 4y = 3$$

11. Using the given figure, determine the following:

- (a) If $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$, and $m\angle 2 = 55$ deg, find $m\angle 6$.
- (b) If $\overleftrightarrow{BD} \parallel \overleftrightarrow{CF}$, and $m\angle 3 = 140$ deg, find $m\angle 4$.
- (c) Which lines must be parallel if $m\angle 3 + m\angle 6 = 180$ deg.

