

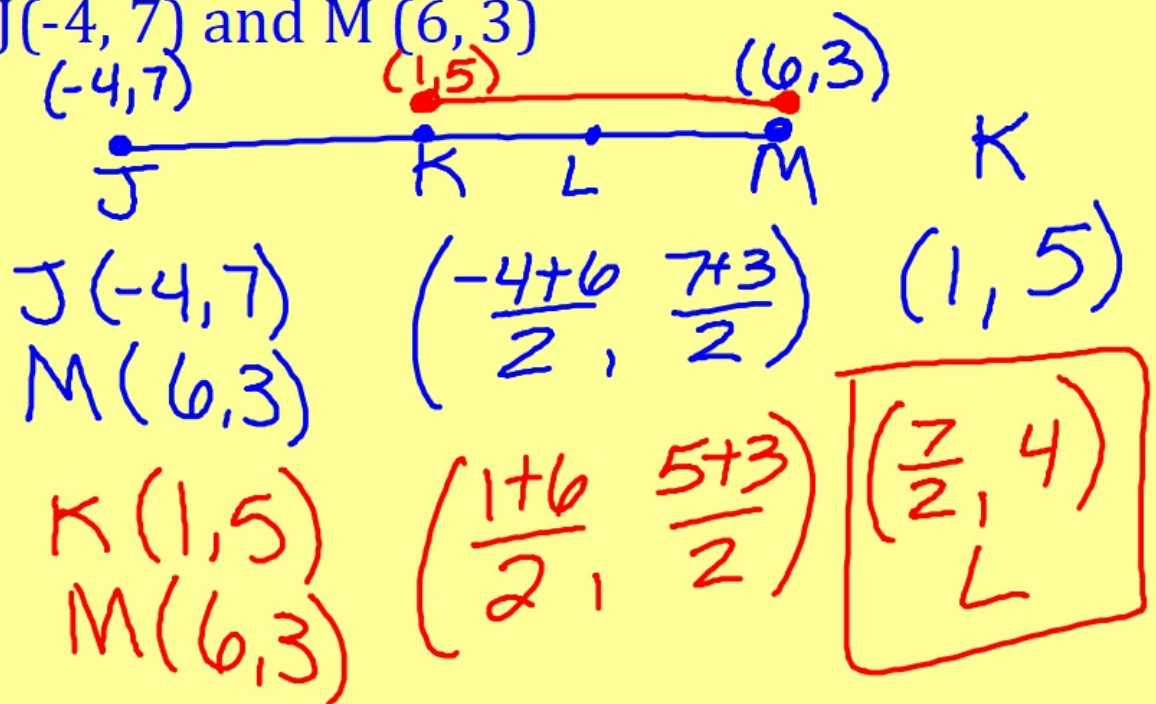
1. Write the following formulas:

Midpoint:  $\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

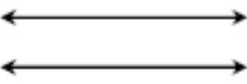
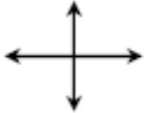
Distance:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

2. Point K is the midpoint of  $\overline{JM}$  and L is the midpoint of  $\overline{KM}$ . Find the coordinates of L given J(-4, 7) and M(6, 3)



# Parallel & Perpendicular Lines

Main Ideas/Questions	Notes/Examples
<p><b>Parallel Lines</b></p> 	<p>Definition: <u>lines that never intersect</u></p> <p>Algebraically, how do we know if two lines are parallel?</p> <p><b>SAME SLOPE</b></p>
<p><b>Perpendicular Lines</b></p> 	<p>Definition: <u>lines that intersect at <math>90^\circ</math></u></p> <p>Algebraically, how do we know if two lines are perpendicular?</p> <p><b>SLOPES are OPPOSITE RECIPROCAL</b></p>

**FLIP IT & SWITCH IT**

## Opposite Reciprocals

Def: a fraction flipped and the sign switched

Some examples:

1)  $\frac{3}{4}$  &  $-\frac{4}{3}$    2)  $2$  &  $-\frac{1}{2}$    3)  $-\frac{7}{8}$  &  $\frac{8}{7}$    4)  $1$  &  $-1$    5)  $0$  &  $\emptyset$

$\frac{2}{1}$

ven  
ered  
irs

$$\frac{2 - Y_1}{2 - X_1}$$

Determine if segments  $\overline{AB}$  and  $\overline{CD}$  are parallel, perpendicular, or nei

1.  $\overline{AB}$  formed by  $(-2, 3)$  and  $(2, 6)$   
 $\overline{CD}$  formed by  $(-1, 0)$  and  $(3, 3)$

$$\overline{AB} \quad m = \frac{6-3}{2-(-2)} = \frac{3}{4}$$

$$\overline{CD} \quad m = \frac{3-0}{3-(-1)} = \frac{3}{4}$$

PARALLEL //

2.  $\overline{AB}$  formed by  $(0, 2)$  and  $(5, 4)$   
 $\overline{CD}$  formed by  $(1, 8)$  and  $(3, 3)$

$$\overline{AB} \quad m = \frac{4-2}{5-0} = \frac{2}{5}$$

$$\overline{CD} \quad m = \frac{3-8}{3-1} = -\frac{5}{2}$$

PERPENDICU  
⊥

3.  $\overline{AB}$  formed by  $(-1, 8)$  and  $(2, 6)$   
 $\overline{CD}$  formed by  $(-1, 2)$  and  $(3, 3)$

$$\overline{AB} \quad m = \frac{6-8}{2-(-1)} = -\frac{2}{3}$$

$$\overline{CD} \quad m = \frac{3-2}{3-(-1)} = \frac{1}{4}$$

Neither

4.  $\overline{AB}$  formed by  $(2, 3)$  and  $(-1, 4)$   
 $\overline{CD}$  formed by  $(-5, 3)$  and  $(-4, 6)$

$$\overline{AB} \quad m = \frac{4-3}{-1-2} = -\frac{1}{3}$$

$$\overline{CD} \quad m = \frac{6-3}{-4-(-5)} = \frac{3}{1} = 3$$

⊥

5.  $\overline{AB}$  formed by (0, -2) and (0, 7)  
 $\overline{CD}$  formed by (3, -5) and (6, -5)

6.  $\overline{AB}$  formed by (-4, 7) and (-2, 6)  
 $\overline{CD}$  formed by (2, -2) and (-8, 3)

7.  $\overline{AB}$  formed by (3, 1) and (3, -4)  
 $\overline{CD}$  formed by (-4, 1) and (-4, 5)

8.  $\overline{AB}$  formed by (-3, 8) and (3, 2)  
 $\overline{CD}$  formed by (7, 1) and (5, -1)

Given Equations

9.  $y = 7x + 2$  and  $y = 7x - 1$

$m = 7$        $m = 7$

//

PARALLEL

10.  $y = \frac{4}{5}x - 8$  and  $y = -\frac{5}{4}x + 3$

$m = \frac{4}{5}$        $m = -\frac{5}{4}$

⊥

PERPENDICULAR

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

$m = -\frac{1}{3}$        $m = \frac{1}{3}$

Neither

12.  $x + 6y = 30$  and  $3y = 18x - 6$

$x + 6y = 30$   
 $-x$

$6y = -x + 30$   
 $6$

$y = -\frac{1}{6}x + 5$

$3y = 18x - 6$   
 $3$

$y = 6x - 2$

⊥

13.  $5x - y = 4$  and  $y = -\frac{1}{5}x + 7$

$$\frac{-y}{-1} = \frac{-5x+4}{-1} \quad \frac{-y}{-1} = \frac{-5x+4}{-1}$$

$$y = 5x - 4$$

$$m = 5$$

$$m = -\frac{1}{5} \perp$$

14.  $3x - y = 2$  and  $12x - 4y = 4$

$$\begin{array}{r} \cancel{3x} - y = 2 \\ -\cancel{3x} \quad -3x \end{array} \quad // \quad \begin{array}{r} \cancel{12x} - 4y = 4 \\ -\cancel{12x} \quad -12x \end{array}$$

$$\frac{-y}{-1} = \frac{-3x+2}{-1} \quad \frac{-4y}{-4} = \frac{-12x+4}{-4}$$

$$y = 3x - 2$$

$$m = 3$$

$$y = 3x - 1$$

$$m = 3$$

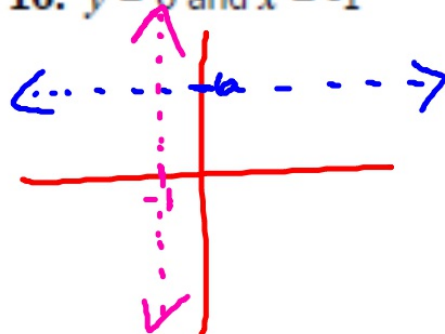
15.  $y = x + 3$  and  $y = -x - 5$

$$m = 1 \quad m = -1$$

$$\frac{1}{1} \rightarrow \frac{1}{1} = -\frac{1}{1}$$

$$\perp$$

16.  $y = 6$  and  $x = -1$



$$\perp$$