Page 527 #27, 35-37 **WARMUP**

In Exercises 27–32 find and then compare lengths of segments.

B **27.** Show that the triangle with vertices $A(-3, 4)$, $M(3, 1)$, and $Y(0, -2)$ is isosceles.

In Exercises 35–38 find an equation of the circle described and sketch the graph.

35. The circle has center (0, 6) and passes through point (6, 14).

36. The circle has center $(-2, -4)$ and passes through point (3, 8).

37. The circle has diameter $\overline{RS}$ where R is $(-3, 2)$ and S is (3, 2).

CHAPTER 13:
COORDINATE GEOMETRY

SECTION 13.3 & 13.5
PARALLEL AND PERPENDICULAR LINES & THE MIDPOINT FORMULA

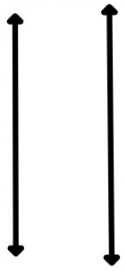
Standards:

- Two nonvertical lines are parallel if and only if their slopes are equal.
  - Two vertical lines or two horizontal lines are parallel

Parallel horizontal lines

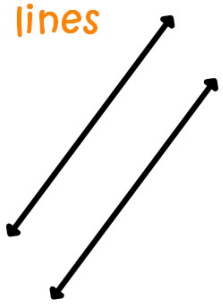
$m = 0$

Parallel vertical lines

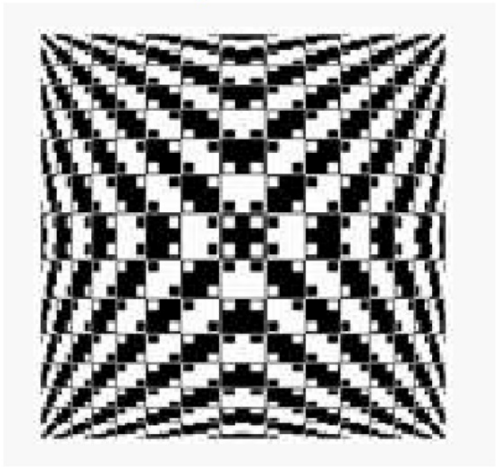


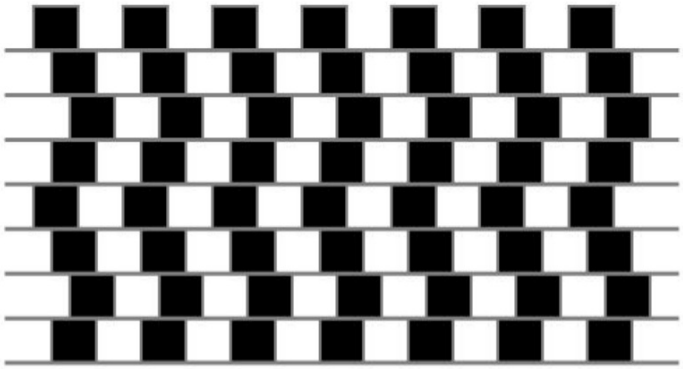
m is undefined

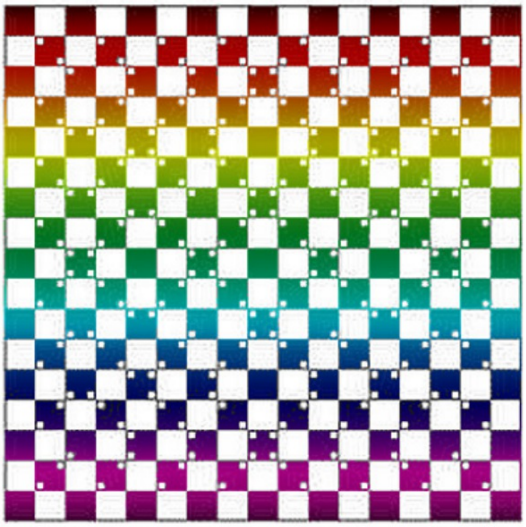
Parallel lines



Are these lines parallel??





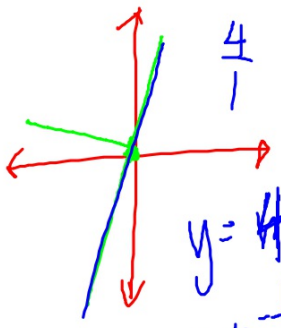


- Two nonvertical lines are perpendicular if and only if the product of their slopes is -1. (FLIP the numbers and change sign)
  - $(m_1)(m_2) = -1$
  - the slopes are negative reciprocals of each other.

    $\frac{3}{2}$ and $\frac{-2}{3}$

    -5 and $\frac{1}{5}$

  - vertical and horizontal lines are perpendicular.



$y = \frac{1}{m}x$

$y = -\frac{1}{4}x$

Example 1:

Find (1.) the slope of the line $\overleftrightarrow{AB}$, (2.) the slope of any line parallel to $\overleftrightarrow{AB}$ and (3.) the slope of any line perpendicular to $\overleftrightarrow{AB}$

a.) A $(\overset{x_1}{-1}, \underset{y_1}{0})$ B $(\overset{x_2}{3}, \underset{y_2}{-2})$

Original $m = \frac{-2-0}{3-(-1)} = \frac{-2}{4} = \boxed{-\frac{1}{2}}$

$\perp m = \boxed{2}$

$/\!/ m = \boxed{-\frac{1}{2}}$ same

answer:

Example 1:

Find (1.) the slope of the line $\overleftrightarrow{AB}$, (2.) the slope of any line parallel to $\overleftrightarrow{AB}$ and (3.) the slope of any line perpendicular to $\overleftrightarrow{AB}$

b.) A $(-3, \overset{y_1}{4})$ B $(1, \overset{y_2}{-2})$

Original $m = \frac{-2-4}{1-(-3)} = \frac{-6}{4} = \boxed{\frac{-3}{2}}$

answer: (1.) org. $\boxed{-3/2}$ (2.) $\parallel$ $\boxed{-3/2}$ (3.) $\perp$ $\boxed{2/3}$

Example 1:

Find (1.) the slope of the line $\overleftrightarrow{AB}$, (2.) the slope of any line parallel to $\overleftrightarrow{AB}$ and (3.) the slope of any line perpendicular to $\overleftrightarrow{AB}$

c.) A (2, 2) B (7, -1)

answer:

Example 1:

Find (1.) the slope of the line $\overleftrightarrow{AB}$, (2.) the slope of any line parallel to $\overleftrightarrow{AB}$ and (3.) the slope of any line perpendicular to $\overleftrightarrow{AB}$

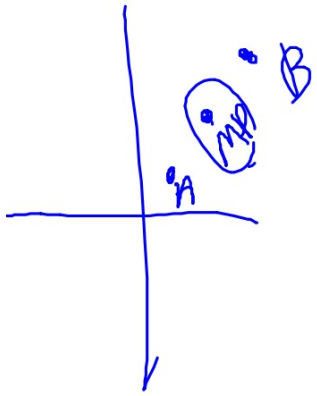
d.) A (2, 5) B (-3, 5)

answer:

The Midpoint Formula: The midpoint of the segment that joins points (x_1, y_1) and (x_2, y_2) is the point

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

A(2,3) B(5,9)



$\frac{7}{2}$ $\frac{12}{2}$

(3.5, 6)

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

a.) A (4, 6) B (2, 10)

$$\frac{4+2}{2}, \frac{6+10}{2}$$

$$\frac{6}{2}, \frac{16}{2}$$

answer: (3, 8)

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

b.) A (6, 5) B (-2, 2)

answer:

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

c.) A (-5, 8) B (1, -8)

answer:

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

d.) A (3, 4) B (-5, 4)

answer:

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

e.) A (2.5, 1.8) B (1.5, -0.8)

answer:

Example 2:

Find the coordinates of the midpoint of the segment that joins the given points.

f.) A (a, 6) B (a+2, 10)

answer:

Example 3:

Find the length, slope and midpoint of $\overline{PQ}$.

a.) P (4, -1) Q (-2, 2)

answer:

Example 3:
Find the length, slope and midpoint of $\overline{PQ}$.

b.) P (3, -2) Q (7, 4)

$$dis = \sqrt{(x-x)^2 + (y-y)^2}$$

$$\sqrt{4^2 + 6^2}$$

$$\sqrt{16 + 36}$$

answer: 3/2, (5, 1)

Example 3:

Find the length, slope and midpoint of $\overline{PQ}$.

c.) P (1, -3) Q (-8, -5)

answer:

Example 4:

M is the midpoint of $\overline{AB}$. Find the coordinates of B.

a.) A (3, 2) M (4, 3)

answer:

Example 4:

M is the midpoint of $\overline{AB}$. Find the coordinates of B.

b.) A (-2, 6) M (1, 3)

answer:

Example 4:

M is the midpoint of $\overline{AB}$. Find the coordinates of B.

c.) A (4, -4) M (0, 0)

answer:

HOMEWORK

Assignment #13.3

- Page 537 WE #1-10
- Page 545-546 WE #1-11, 14