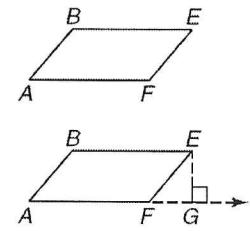


Key

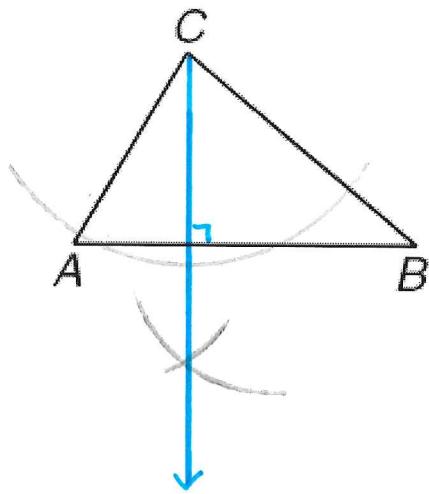
Notes: 3-6 Perpendiculars and Distance 2014

Distance: The distance from a line to a point not on the line is the length of the perpendicular segment from the point to the line.

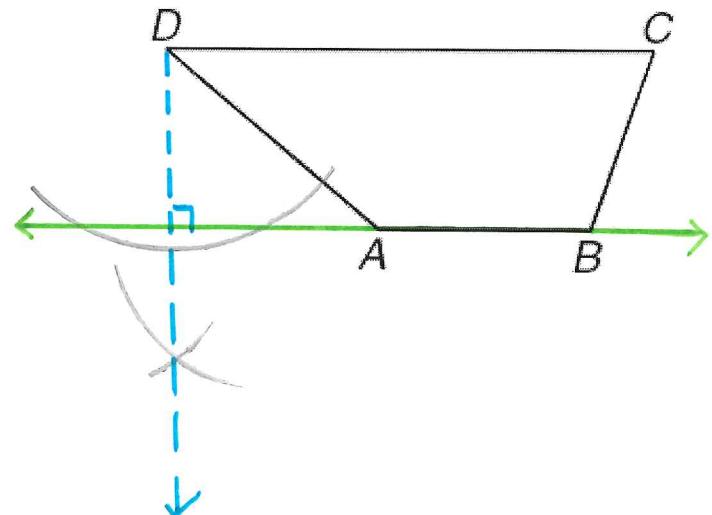


Construct the distance that represents the given information.

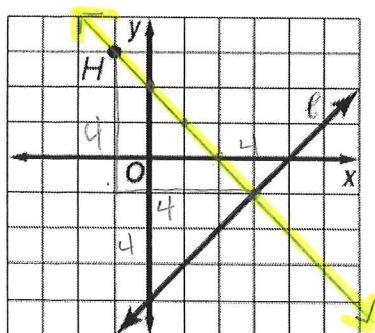
1. C to \overleftrightarrow{AB}



2. D to \overleftrightarrow{AB}



- 1) Construct a line perpendicular to l through $H(-1, 3)$. Then find the distance from H to l .



Steps:

1. Find the perpendicular slope to the line

$$m = \frac{4}{4} \quad m_{\perp} = -1$$

2. Graph the perpendicular line through the point

3. Find the intersection point

$$(3, -1)$$

4. Find the distance from both points

$$4^2 + 4^2 = d^2$$

$$\boxed{4\sqrt{2} = d}$$

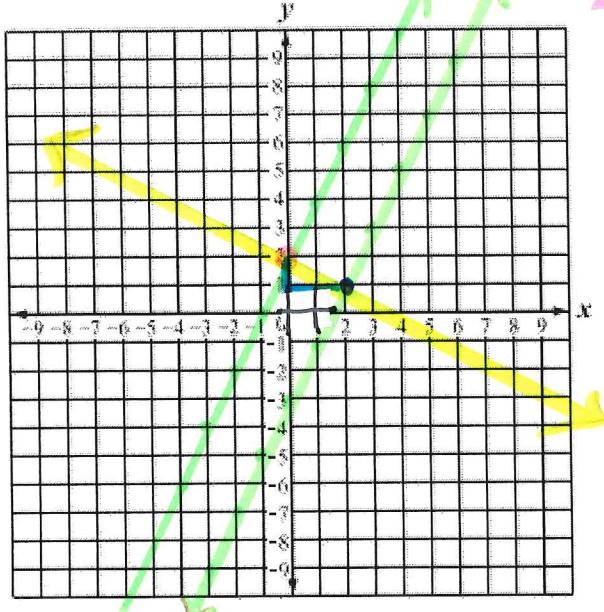
Distance between two parallel lines: The perpendicular distance between one of the lines and any point on the other line.

Steps to find the distance between two parallel lines

1. Graph the lines ✓
2. Use one y-intercept and perpendicular slope to find the equation of the perpendicular line.
3. Find the intersection point between the perpendicular line and other parallel line.
4. Solve the system
5. Find the distance.

Find the distance between each pair of parallel lines with the given equations.

2) $y = 2x + 2, y = 2x - 3$



2.) Y int (0, 2)

$$m_1 = -\frac{1}{2}$$

$$Y = -\frac{1}{2}x + 2$$

3.) use $y = -\frac{1}{2}x + 2$ and the other given line $y = 2x - 3$

4.) $y = -\frac{1}{2}x + 2$

$$y = 2x - 3$$

use substitution

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

Find y

$$y = 2(2) - 3$$

$$y = 1$$

$$\begin{aligned} \frac{4}{2}x - 3 &= -\frac{1}{2}x + 2 \\ +\frac{1}{2}x + 3 &= +\frac{1}{2}x + 3 \end{aligned}$$

$$\frac{2}{5} \cdot \frac{5}{2}x = 5 \cdot \frac{2}{5}$$

$$x = 2$$

Point of intersection of 2nd line and $(2, 1)$

5.) Find distance

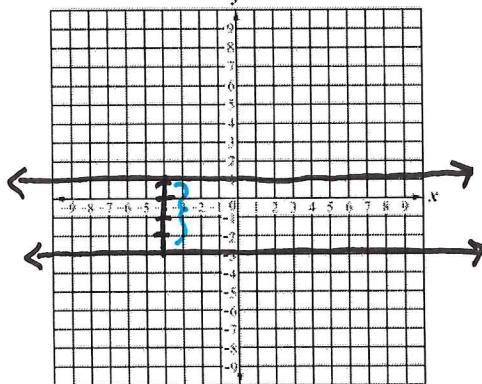
between chosen y int from step 2 and point found from step 4 $(0, 2)$ and $(2, 1)$

$$2^2 + 1^2 = d^2$$

$$\sqrt{5} = d$$

The distance between the two parallel lines is $\sqrt{5}$ units.

3) $y = -3, y = 1$

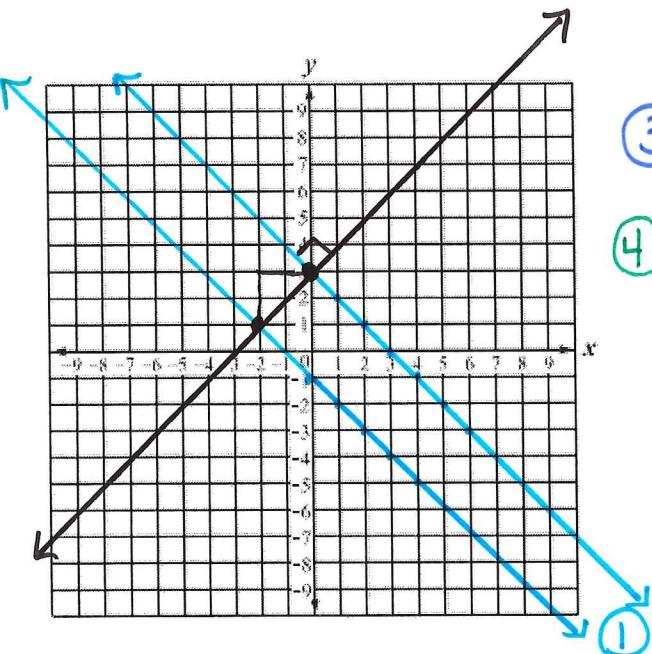


The distance between the two parallel lines is 4 units.

4) $y = -x + 3, y = -x - 1$

② From 1st line $y \text{ int } (0, 3) m_1 = 1$

$$y = 1x + 3$$



③ $y = x + 3$ $y = -x - 1$

④ $x + 3 = -x - 1$
 $+1 \quad +1$
 $-x \quad -x$
 $4 = -2x$
 $\boxed{-2 = x}$

$$y = -2 + 3$$

$$\boxed{y = 1}$$

Point of intersection

(-2, 1)

⑤ $2^2 + 2^2 = d^2$
 $\sqrt{8} = \sqrt{d^2}$

$2\sqrt{2} = d$

∴ The distance between the two parallel lines is $2\sqrt{2}$ units