4.2 notes

Friday, September 25, 2020 1:19 PM

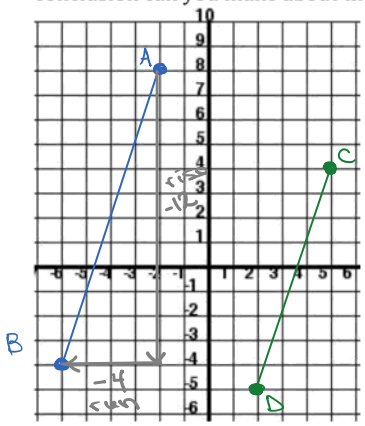
Lines equal distant apart that will never intersect.
ex AB ∥ CD

Lines that intersect at a 90° (right) angle.
ex AB ⊥ CD

Foundations and Precalculus 10

4.2 Slopes of Parallel and Perpendicular Lines

Ex.1: Graph the line segment AB with endpoints A $(-2, 8)$ and B $(-6, -4)$. Graph the line segment CD with endpoints C $(5, 4)$ and D $(2, -5)$. Find the slopes of both lines. What conclusion can you make about the two lines?



$m_{AB} = \frac{\text{rise}}{\text{run}}$

$m_{AB} = \frac{-12}{-4}$

$m_{AB} = 3$

$m_{CD} = \frac{y_2 - y_1}{x_2 - x_1}$

$m_{CD} = \frac{(-5) - (4)}{(2) - (5)}$

$m_{CD} = \frac{-9}{-3}$

$m_{CD} = 3$

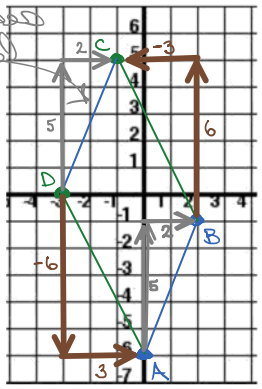
$m_{AB} = m_{CD}$: the lines are both rising 3 and running 1 and therefore will never cross so AB ∥ CD.

Parallel Lines
Parallel lines are lines that never cross.
Lines & line segments are parallel if they have the same slope.

Ex. 2: Determine whether the quadrilateral (4-sided figure) with vertices A $(0, -6)$, B $(2, -1)$, C $(-1, 5)$ and D $(-3, 0)$ is a parallelogram.

4 sides where opposites sides are parallel.

opposite sides look parallel but need to calculate slopes to prove this.



$m_{AB} = \frac{\text{rise}}{\text{run}}$ $m_{CD} = \frac{\text{rise}}{\text{run}}$

$m_{AB} = \frac{5}{2}$ ↔ same $m_{CD} = \frac{5}{2}$ → AB ∥ CD

$m_{AD} = \frac{\text{rise}}{\text{run}}$ $m_{BC} = \frac{\text{rise}}{\text{run}}$

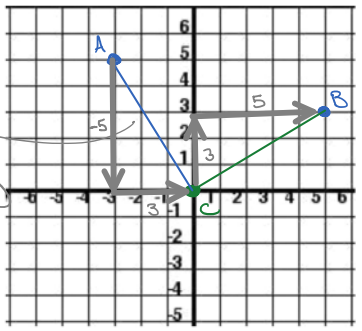
$m_{AD} = \frac{-6}{3}$ $m_{BC} = \frac{6}{-3}$

$m_{AD} = -2$ ↔ same $m_{BC} = -2$ → AD ∥ BC

Since opposite sides are parallel then the quadrilateral is a parallelogram.

this coordinate is called the 'origin'.

Ex. 3: Graph A (−3, 5), B (5, 3) and C (0, 0). Find the slope of segment CA and CB. What conclusion can you make about the two lines?



Lines look parallel but must prove by calculating slopes.

$m_{CA} = \frac{rise}{run}$ $m_{CB} = \frac{rise}{run}$

$m_{CA} = \frac{-5}{3}$ $m_{CB} = \frac{3}{5}$

slopes are negative reciprocals

sign flipped

fraction flipped

Perpendicular Lines

⊥ Perpendicular lines & line segments meet (or will meet) at 90° angles.

⊥ The slopes of perpendicular lines & line segments will have a product of −1.

check: $(-\frac{5}{3})(\frac{3}{5}) = -\frac{15}{15} = -1$ ✓

⊥ The slopes of perpendicular lines are also referred to as negative reciprocals; that is, a line with slope a, $a \neq 0$, is perpendicular to a line with slope: $-\frac{1}{a}$

Ex. 4: State the slope that would be perpendicular to the slopes given

m=$\frac{2}{3}$ ⊥ $m = -\frac{3}{2}$ m=$\frac{-1}{7}$ ⊥ $m = 7$ m=$\frac{1}{1}$ ⊥ $m = -1$ m=0 ⊥ $m = \frac{1}{0}$ = undefined

Ex. 5: A line segment has endpoints E $(2, 3)$ and F $(-4, -1)$. Determine the coordinates of a point G so that the line EG is perpendicular to line EF.

(x_1, y_1) (x_2, y_2)

$m_{EF} = \frac{y_2 - y_1}{x_2 - x_1}$

$m_{EF} = \frac{(-1)-(3)}{(-4)-(2)}$

$m_{EF} = \frac{-4 \div 2}{-6 \div 2}$

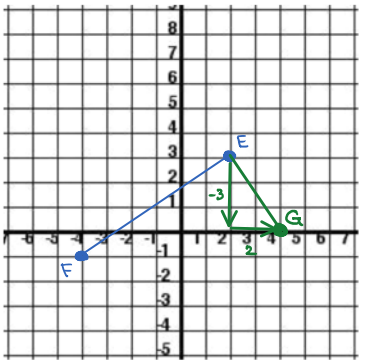
$m_{EF} = \frac{2}{3}$

$m_{EG} = -\frac{3}{2}$

so from E: rise −3 and run 2.

G(4, 0)

Is there other possible answers?



Steps:
① find m_{EF}
② determine ⊥ slope
③ travel rise & run of ⊥ slope from point E.

HW p 349 #5,6,8,9,12,17