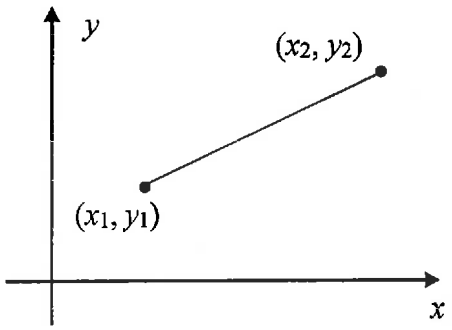
Name: Key Date: _____

Geometry Notes CG - 1: Slope

Slope = $\frac{\text{rise}}{\text{run}}$

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



Ex: Find the slope of the line through the points (–3, 2) and (3, –1).

$m = \frac{y - y}{x - x} = \frac{-1 - 2}{3 - (-3)} = \frac{-3}{6} = \frac{-1}{2}$

Four cases:

1. Positive → uphill
2. Negative → downhill
3. Zero ↔ horizontal $y = \#$ no x's in equation
4. Undefined ↕ vertical $x = \#$ no y's in equation

Ex: Find the slope of $\overline{PQ}$ if $P(a, a + b)$ and $Q(5a, b - 2a)$

$m = \frac{y - y}{x - x} = \frac{b - 2a - (a + b)}{5a - a} = \frac{b - 2a - a - b}{5a - a}$

$= \frac{-3a}{4a}$

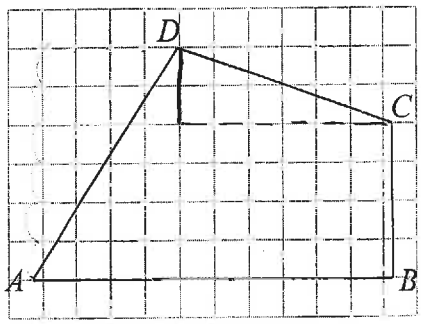
$= \frac{-3}{4}$

Name: Key Date:

Geometry HW: CG - 1

1. Find the slope of each side of quadrilateral *ABCD* shown in the figure at right.

$m = \frac{\text{rise}}{\text{run}}$



$\overline{AB}$ = zero

$\overline{BC}$ = undefined

$\overline{DC} = \frac{-2}{6} = -\frac{1}{3}$

$\overline{DA} = \frac{6}{4} = \frac{3}{2}$

2. Find the slope of the line segment joining each pair of points.

a. (–23, 39) and (58, –15)

$m = \frac{y-y}{x-x} = \frac{-15-39}{58-(-23)} = \frac{-54}{81} = \boxed{-\frac{2}{3}}$

b. $(a, 3a-b)$ and $(a+2b, 3a-5b)$

$m = \frac{3a-5b-(3a-b)}{a+2b-a} = \frac{3a-5b-3a+b}{2b} = \frac{-4b}{2b} = \boxed{-2}$

3. Find the value of x so that the line passing through the points (3, –2) and $(x, 6)$ will have an undefined slope.

$m = \frac{y-y}{x-x} = \frac{6-(-2)}{x-3} = \frac{8}{x-3} = 0$ $\boxed{x=3}$

4. Find the value of k so that the line passing through (3, –2) and $(3k+5, k-6)$ will have a slope of 3/2.

$m = \frac{k-6+(2)}{3k+5-3} = \frac{k-4}{3k+2} = \frac{3}{2}$

$2(k-4) = 3(3k+2)$

$2k-8 = 9k+6$

$-2k \quad -2k$

$-8 = 7k+6$

$-6 \quad -6$

$-14 = 7k$

$\boxed{k=-2}$

5. Find two values of a so that the line passing through $(a, 10)$ and $(7, a^2-3a)$ will have a slope of 0.

$m = \frac{a^2-3a-10}{7-a} = 0$

$a^2-3a-10=0$

$(a+2)(a-5)=0$

$\boxed{a=-2}$ $\boxed{a=5}$

6. Determine if the three points $R(-7, -5)$, $S(5, 2)$ and $T(12, 6)$ are collinear. Justify your answer. (Think: If all three are on the same line, what must be true about the slopes of $\overline{RS}$ and $\overline{ST}$?)

$\overline{RS} = \frac{-5-2}{-7-5} = \frac{-7}{-12} = \frac{7}{12}$ $\quad ST = \frac{6-2}{12-5} = \frac{4}{7}$

No, Not collinear ∴ slopes not same

7. Find the value of x that will make the points $J(-4, 15)$, $K(x, 10)$ and $L(14, 3)$ collinear.

$\overline{JL} = \frac{15-3}{-4-14} = \frac{12}{-18} = -\frac{2}{3}$

$KL = \frac{10-3}{x-14} = \frac{7}{x-14} = -\frac{2}{3}$

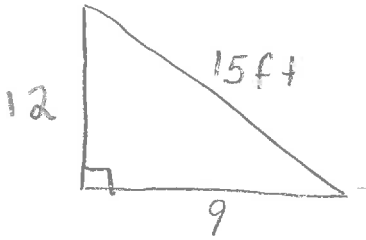
$-21 = 2(x-14)$

$-21 = 2x - 28$

$\frac{7}{2} = \frac{2x}{2}$

$x = 3.5$

8. A ladder 15 feet long leans against a vertical wall. The top of the ladder is 12 feet above the level ground. What is the slope of the ladder (assume it's positive)?



$a^2 + b^2 = c^2$

$12^2 + b^2 = 15^2$

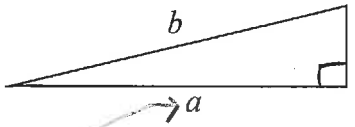
$144 + b^2 = 225$

$b^2 = 81$

$m = \frac{rise}{run} = \frac{12}{9} = \frac{4}{3}$

9. Tommy Hawk is building a skateboard ramp. He wants it to have a slope of 2/7 and a vertical rise (height) of 5 feet.

a. What horizontal distance will the ramp cover?



$\frac{2}{7} = \frac{5}{x}$

$2x = 35$

$x = 17.5$

b. How long will the actual ramp be?

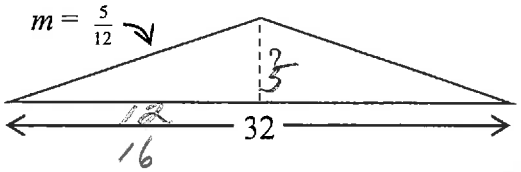
$5^2 + 17.5^2 = b^2$

$25 + 306.25 = b^2$

$331.25 = b^2$

18.2

10. A certain roof has a pitch (a builder's word for slope) of 5/12 on each side. The entire roof is to be 32 feet wide. How high will the ridge line be above the attic floor?



$\frac{5}{12} = \frac{x}{16}$

$80 = 12x$

$6.67 = x$