3-6   RATE OF CHANGE AND SLOPE

REVIEW:

What is the slope formula? $\longrightarrow$ $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

What do you need to know in order to use the slope formula? __the coordinates__ __of two points on the line.__

What if we were given a slope and *SOME* of the needed information? Would you be able to use the slope formula to solve for the missing information? SURE YOU WOULD!!

Example 1:

✳ **Given the points (r, 3) and (5, 9), find the value of r so that the slope of the line passing** ✳
through the two points is ② $= m$

So, we want to find the value of r so that the line that passes through each pair of points has the given slope. To do this, follow these steps:

1. __If m is an integer, write it as $\dfrac{m}{1}$.__

2. __Set $\dfrac{m}{1} = \dfrac{y_2 - y_1}{x_2 - x_1}$__ ⟵ proportion

3. __Simplify, cross multiply, solve for r.__

Let's solve example 1: $(r, 3)$ and $(5, 9)$; $m = 2 \rightarrow \dfrac{m}{1} = \dfrac{2}{1}$
                               $x_1 y_1$ $x_2 y_2$

$\dfrac{m}{1} = \dfrac{y_2 - y_1}{x_2 - x_1} \rightarrow \dfrac{2}{1} = \dfrac{9-3}{5-r} \rightarrow \dfrac{2}{1} = \dfrac{6}{(5-r)}$

                                                            ↓
$2(5 - r) = 6 \cdot 1$ ⟵   cross
                                               multiply
$10 - 2r = 6$ solve for r.
$-10 \quad \downarrow \quad -10$

$\dfrac{-2r}{-2} = \dfrac{-4}{-2} \rightarrow (r = 2)$

────────────────────────────

check: $(r, 3)$ and $(5, 9)$; $m = 2$
        $(2, 3)$ $x_2 y_2$
         $x_1 y_1$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{9-3}{5-2} = \dfrac{6}{3} = ②$

Find the value of r so the line that passes through each pair of points has the given slope.

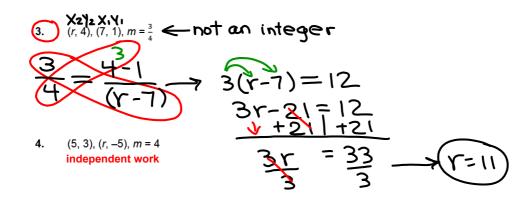1. $(5, 9), (r, -3), m = -4$ $\rightarrow \dfrac{-4}{1}$

$\underset{x_1 \, y_1 \quad x_2 \, y_2}{}$

$\dfrac{-4}{1} = \dfrac{-3-9}{r-5} \rightarrow \dfrac{-4}{1} = \dfrac{-12}{(r-5)} \rightarrow -4(r-5) = -12 \cdot 1$

$\dfrac{m}{1} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$-4(r-5) = -12 \cdot 1$

$-4r + 20 = -12$

$\quad\quad -20 \mid -20$

2. $(r, 2), (6, 3), m = \dfrac{1}{2}$
    independent work

$\dfrac{-4r}{-4} = \dfrac{-32}{-4}$

$\boxed{r = 8}$

3. Ⓐ $\underset{x_2 \, y_2 \quad x_1 \, y_1}{}$ $(r, 4), (7, 1), m = \dfrac{3}{4}$ ← not an integer

$\dfrac{3}{4} = \dfrac{4-1}{(r-7)} \rightarrow 3(r-7) = 12$

$3r - 21 = 12$

$\quad\quad +21 \mid +21$

4. $(5, 3), (r, -5), m = 4$
    independent work

$\dfrac{3r}{3} = \dfrac{33}{3} \rightarrow \boxed{r = 11}$

5. $(7, r), (4, 6), m = 0$
    independent work