10/12 Algebra 1 – Downing

Linear?

x	y	
1	5	
		+5
3	10	
		+5
5	15	
		+10
7	25	

+2, +2, +2

$\frac{5}{2}$ $\frac{5}{2}$ $\frac{10}{2}=\frac{5}{1}$

Not Linear

Not the same rate of change

x	y	
3	2	
		+2
8	4	
		+4
18	8	
		+2
23	10	

+5, +10, +5

$\frac{2}{5}$ $\frac{4}{10}=\frac{2}{5}$ $\frac{2}{5}$

Yes – Linear

Same rate of change

– Go over HW

Parallel and Perpendicular

Parallel Lines ↗↙

- Never touch, Never intersect
- SAME slope
- All vertical lines are parallel to each other
- All horizontal lines are parallel to each other

* Which lines are parallel?

① $y=\frac{5}{3}x-2$ $m=\frac{5}{3}$

② $y=x$ $m=1$

③ $y=\frac{5}{3}x+4$ $m=\frac{5}{3}$

④ $y=x+1$ $m=1$

① and ③ are parallel

② and ④ are parallel

* Which lines are parallel?

① $y=2x-3$ $m=2$

② $y=-\frac{2}{3}x+2$ $m=-\frac{2}{3}$

③ $2x+3y=8$ → needs to be solved for y

④ $y+1=3(x-3)$

Solve for y

$y+1=3(x-3)$

$y+1=3x-9$

$-1 \quad -1$

$y=3x-10$

$m=3$

$2x+3y=8$

$-2x \quad -2x$

$\frac{3y}{3}=\frac{-2x}{3}+\frac{8}{3}$

$y=-\frac{2}{3}x+\frac{8}{3}$

$m=-\frac{2}{3}$

② and ③ are parallel

Perpendicular Lines

- Intersect to form a right angle (90°)
- Slopes are opposite reciprocals
  ($^{+ \text{ to } -}_{- \text{ to } +}$) (flip)

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

-4 and $\frac{1}{4}$

$\frac{1}{3}$ and $\frac{-3}{1}$ or -3

- Product of slopes is -1

  $\left(\frac{2}{3} \cdot \frac{-3}{2}\right) = -1$

  $\left(-4 \cdot \frac{1}{4}\right) = -1$

- Vertical and Horizontal Lines are perpendicular

* Which are perpendicular?

(1) $y = 3$ $\quad m = 0$

(2) $y = 3x$ $\quad m = 3$

(3) $x = -2$ $\quad m =$ undef.

(4) $\frac{3y}{3} = \frac{-x-4}{3}$

$y = -\frac{1}{3}x - \frac{4}{3}$ $\quad m = -\frac{1}{3}$

(1) and (3)

(2) and (4) are perp.

Ex: Through $(\overset{x}{5}, \overset{y}{-2})$ and is perpendicular to $y = -\frac{1}{4}x + 5$

$m = -\frac{1}{4}$ (slope) $\quad \perp m = \frac{4}{1}$ (our slope)

$-2 = 4(5) + b$

$-2 = 20 + b$

$-20 \quad -20$

$-22 = b$

$y = 4x - 22$

Classwork

p. 191 1st set #5-8, 16, 18

HW → p. 191 9-12, 20, 22, 24

Ex) Write an equation of a line that passes through $(\overset{x}{4}, \overset{y}{10})$ and is parallel to $y = 3x + 8$

$m = 3$

$10 = 3(4) + b$

$10 = 12 + b$

$-12 \quad -12$

$-2 = b$

$y = 3x - 2$

Ex) Through $(5, 7)$ and parallel to $-4x + 5y = -30$

$y = mx + b$

$7 = \frac{4}{5}(5) + b$

$7 = 4 + b$

$-4 \quad -4$

$3 = b$

$y = \frac{4}{5}x + 3$

$+4x \quad +4x$

$\frac{5y}{5} = \frac{4x}{5} - \frac{30}{5}$

$y = \frac{4}{5}x - 6$

$m = \frac{4}{5}$