Name:_____ Date:_____

Homework sheet: Alg2H
Lines, slopes, and more: Intro 2

1. (Book1 249**) Let $P = (x, y)$ and $Q = (1,5)$.
   a. Write an equation that states that the slope of line PQ is 3.

$$\text{slope}(PQ) = \frac{y-5}{x-1} = 3$$

   b. Show how this slope equation (from previous part) can be rewritten in the form

$$y - 5 = 3(x - 1)$$

Multiply both sides by $(x-1)$

$$y-5 = 3(x-1)$$

   c. This linear equation is said to be in point-slope form. Explain the terminology.

From this form, you can easily see the lines goes through the point $x=1, y=5$, and slope is 3

   d. Find coordinates for three different points P that fit this equation.

$x=0 \rightarrow y = 3(0-1)+5 = 2$

$x=2 \rightarrow y = 3(2-1)+5 = 8$

$x=-1 \rightarrow y = 3(-1-1)+5 = -1$

$(0,2)$
$(2,8)$
$(-1,-1)$

Problems denoted with ** mark are taken from Exeter Phillips Academy (NH) math curriculum.

2. (Book1 250**) (Continuation) What do the lines

$$y = 3(x-1)+5,$$
$$y = 2(x-1)+5, \text{ and}$$
$$y = -\frac{1}{2}(x-1)+5$$

all have in common? How do they differ from each other?

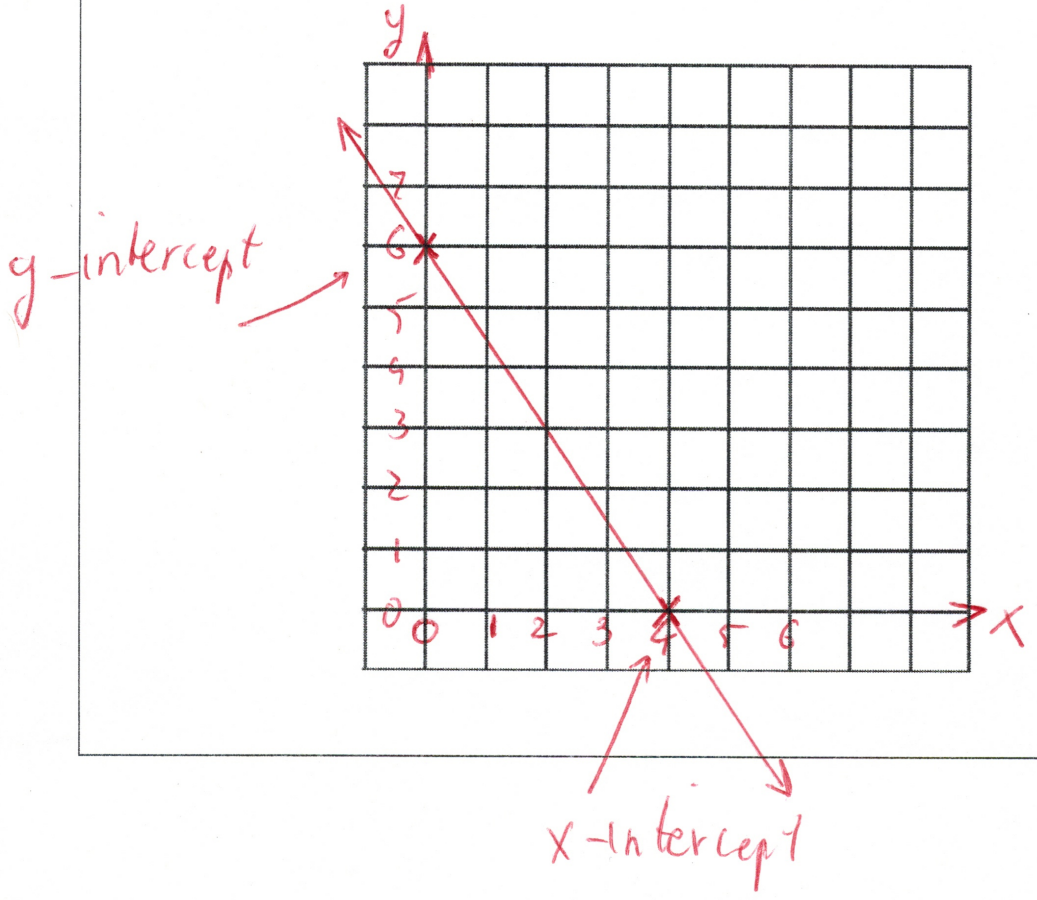
a. All these lines go through the point (1, 5).

b. The lines have different slopes: $3, 2, -\frac{1}{2}$.

3. (Book1 199**) By hand (meaning only paper and pencil, or in your head), find coordinates for the points where the line

$$3x + 2y = 12$$

intersects the x-axis and the y-axis. These points are called the x-intercept and y-intercept, respectively. Use these points to make a quick sketch of the line.



y-intercept

$x = 0$

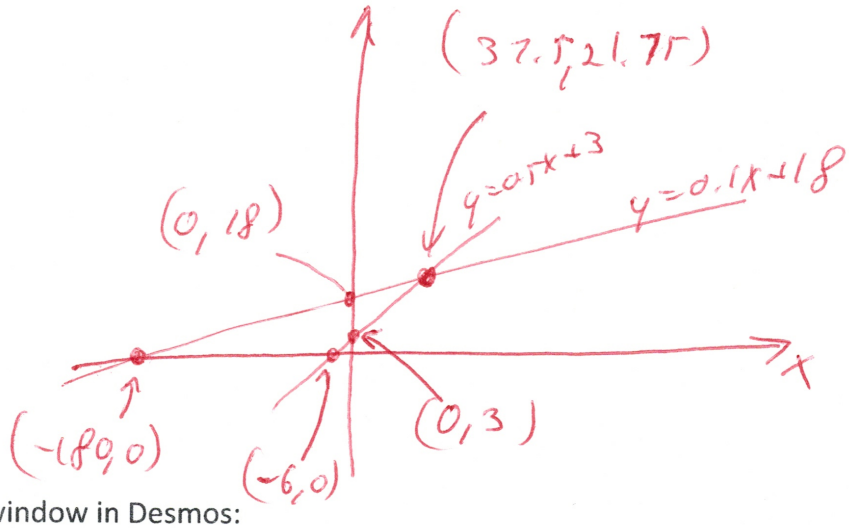
$2y = 12 \Rightarrow y = 6$

x-intercept

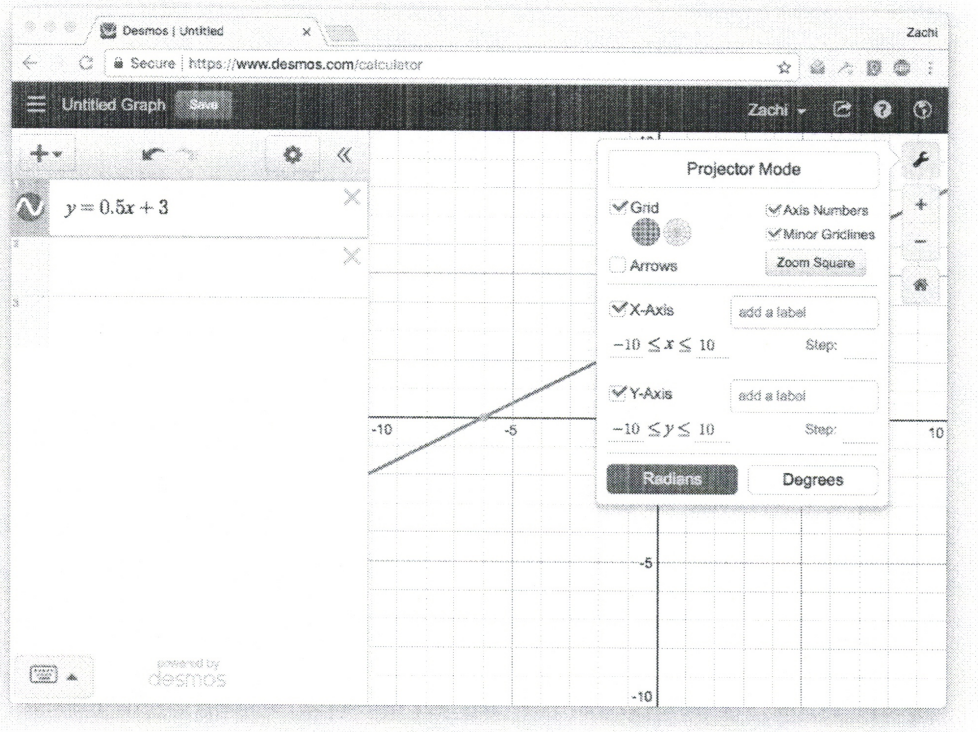
$y = 0$

$3x = 12 \Rightarrow x = 4$

4. (Book1 202**) Using a graphing tool (TI calculator, Desmos, etc), with the window set as $-10 \leq x \leq 10$ and $-10 \leq y \leq 10$, graph the line $y = 0.5x + 3$. Notice that you can see both axis intercepts. Now graph $y = 0.1x + 18$ using the same window settings. What happens? Why? Calculate by hand the axis intercepts and adjust your window so that they are visible. Try and hand-draw the result in the space below.



How to set axis window in Desmos:



5. Absolute value review: (In the book, pages 87-90)

Page 88:

(a) $\lvert 7x\rvert = 7\lvert x\rvert$	(b) $\lvert x^8\rvert = x^8$
(c) $\lvert 5a^2b\rvert = 5a^2\lvert b\rvert$	(d) $\left\lvert \frac{7a}{b^2}\right\rvert = \frac{7\lvert a\rvert}{b^2}$
(e) $\lvert -9x\rvert = 9\lvert x\rvert$	

(f) $\lvert (-6)-(-35)\rvert = \lvert +29\rvert = 29$	(g) $\lvert 19-14\rvert = 5$
(h) $\lvert (-3)-(17)\rvert = \lvert -20\rvert = 20$	

Page 91:

(1) $\lvert 3x\rvert = 3\lvert x\rvert$	(5) $\lvert 9x^2y^3\rvert = 9x^2y^2\lvert y\rvert$
(10) $\lvert -9t\rvert = 9\lvert t\rvert$	(18) $\lvert (-18)-(-37)\rvert = \lvert 19\rvert = 19$

(21) $\lvert x\rvert = 3$ $x = 3$ or $x = -3$	(23) $\lvert x\rvert < 3$ $-3 < x$ AND $x < 3$