

IM2 Problem Set 4.7 - Linear Relations

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> ● What is meant by the term FUNCTIONS and how do we work with them? ● mastery with working with basics & applications of linear functions ● mastery with working with basics & applications of linear systems ● understanding basics of function concepts and apply them to lines & linear systems
-------------------------------------	---

Part 1 - Skills/Concepts Review

1. Use mini whiteboards to graph the following linear relations:

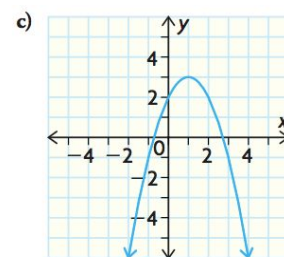
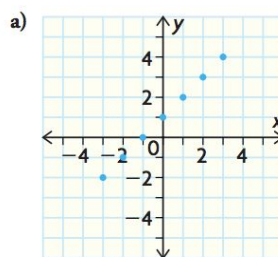
a. $f(x) = 5 - 2x$ b. $g(x) = -\frac{1}{3}x + 4$ c. $2x - 3y = 12$ d. $y = 2$ e. $x = -3$

2. Graph the linear relation $-3x + 6y = 18$ on your TI-84 calculator.

a. For the following points, determine whether they are on the line or above the line or below the line: i. (12,9) ii. (1,2) iii. (6,10) iv. (-2,-4) v. (-2, 2)

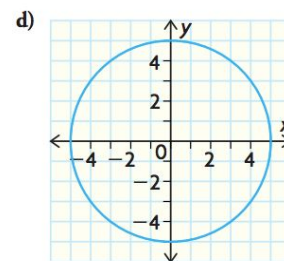
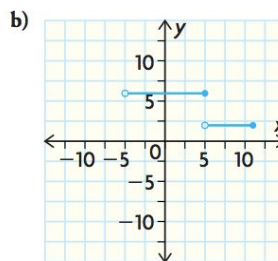
b. Given your answers, explain how would you graph the linear inequality $-3x + 6y \leq 18$? Graph this inequality in your notebooks.

3. For the following relations, determine the domain and range and explain whether or not the relation is/isn't a function.



4. Add the following:

a. $354 + 495$
 b. $2x + 5 + 6 - 2x$
 c. $2x + 3y + 5 - 4x + y - 11$
 d. $x + 2y - 5x - 4y$

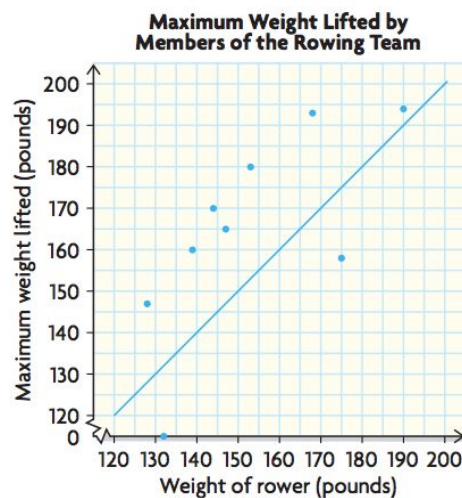


5. Add the following functions together. What type of function results from the addition of linear functions? a. $f(x) = 2x + 4$ and $g(x) = -5x + 9$ b. $f(x) = -\frac{1}{2}x - 6$ and $g(x) = 3x + 2$

6. Subtract the following functions together. What type of function results from the subtraction of linear functions? a. $f(x) = 2x + 4$ and $g(x) = -5x + 9$ b. $f(x) = -\frac{1}{2}x - 6$ and $g(x) = 3x + 2$

Part 2 - Skills/Concepts Application Problems

7. The school rowing coach measures the maximum amount of weight that can be lifted by each member of the rowing team. The results are shown in the scatter-plot shown.



- Why is the line of best fit drawn NOT appropriate?
 - Sketch an appropriate line of best fit.
 - Determine the equation of your line of best fit.
 - What does the slope of the line mean?
8. Given the linear functions $f(x) = 2x + 7$ and $g(x) = 5 - x$.
- Explain how you know that these lines MUST intersect.
 - Graph each line and estimate the intersection point.
 - How could you determine the EXACT intersection point?

9. Linear systems: Solve the following linear system by elimination.

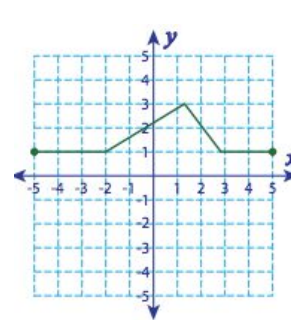
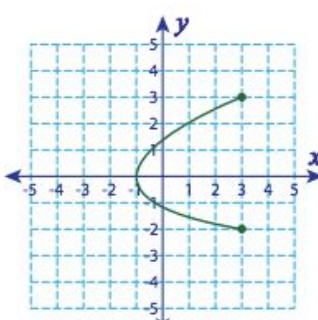
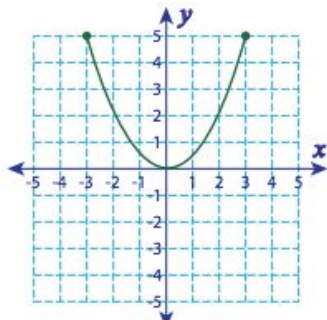
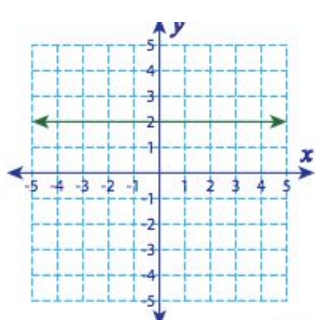
- $L_1: 2x + 5y = 4$ and $L_2: -2x + y = 8$
- $L_1: x + y = 5$ and $L_2: 3x + y = 11$

10. Linear systems: Solve the linear system $y = 2x - 4$ and $3x + 2y = 15$ using the substitution method.

11. Sketch the graph of a “linear” function that meets the following conditions:

- The domain is $\{x \in \mathbf{R} \mid -2 < x \leq 4\}$ and the range is $\{y \in \mathbf{R} \mid 2 \leq y < 5\}$
- The function must have 2 “sections” where there are different slopes.
- Write the equation of your function.

12. For the following relations, determine the domain and range and explain whether or not the relation is/isn't a function.



Part 3 - Extension Problems

13. If $f(x) = \begin{cases} 1 & x > 0 \\ 0 & x = 0 \\ -1 & x < 0, \end{cases}$

- a. find the value of $f(10) - f(-3)$.
- b. Sketch $y = f(x)$

14. For all real numbers x and y , we will define $x \spadesuit y$ as the following $x \spadesuit y = (x + y)(x - y)$. What is the value of $3 \spadesuit (4 \spadesuit 5)$?

HOMEWORK PROBLEMS:

- (1) Nelson 10, Chap 1.4, p39, Q5abc
- (2) Nelson 10, Chap 1.6, p55, Q6ab