College Algebra
Workshop 6

Linear Functions

For each of the following equations, the value y is a linear function of the number x. For each of these functions, analytically find (i) the x-intercept and the y-intercept; (ii) the slope m; (iii) the root input; (iv) the set of upper inputs; and (v) the set of lower inputs. Then sketch a good graph of each function.

1. $2x - y = 4$ **2.** $y = 3 - x$ **3.** $y = -1.5$ **4.** $2(x - y) = 3(1 - y)$

For each of the lines in Practice Exercises 5–8, (i) compute or estimate the slope; (ii) give the symbol rule.

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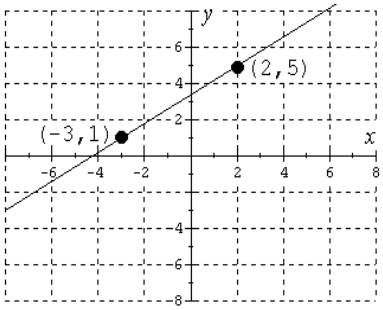

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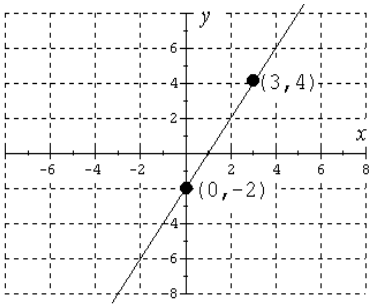

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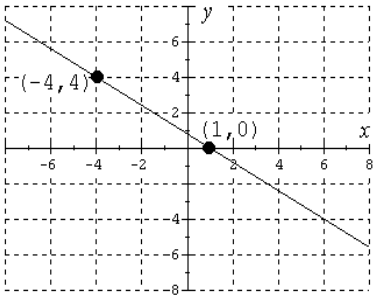

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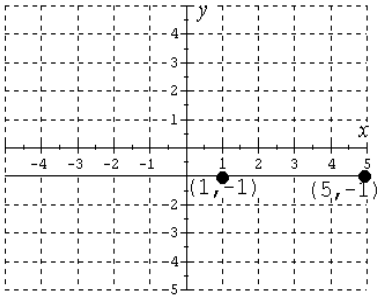


9. What is the slope of a vertical line? Justify your answer.

10. Consider the linear function $4x + 3y = 24$. Find the length of the portion of this line that is contained in the first quadrant. (Hint: Graphing the line might help.)

11. Let $f(x) = 3x - 1$. Simplify each of the following expressions.

a. $\dfrac{f(5) - f(2)}{5 - 2}$ **b.** $\dfrac{f(1) - f(-3)}{1 - (-3)}$

c. $\dfrac{f(2/3) - f(1/3)}{(2/3) - (1/3)}$ **d.** $\dfrac{f(x+h) - f(x)}{(x+h) - x}$

12. The owner of the Egg Roll Cart has determined that the monthly profit y (in dollars) and the number x of egg rolls that are sold are related by the equation $0.1x - y = 300$.

a. Show that y is a linear function of x by rewriting the equation in explicit form and then identifying the coefficients m and b.

b. Interpret the slope m of this function using a complete sentence.

c. Is the value 100 in the range of this function? If the answer is yes, find the matching input.

d. Determine if the point $(3\,000, 0)$ lies on the graph of this function. Justify your answer.

e. What is the y-intercept of this function? How would you interpret this value in the context of the problem?

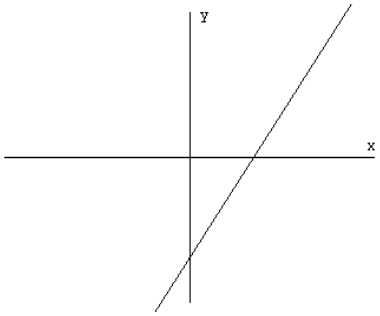
13. General Chip Corporation has signed a contract with Tuan and Ermelinda to purchase their jalepeño flavoring for potato chips. A mechanical engineer at General Chip is designing a new machine to coat the chips with the jalepeño flavoring. This machine will have a dial that can be set from 0 to 20. At a setting of 0 the machine can coat 80 oz per minute, while at a setting of 20 the machine can coat 240 oz per minute. In order to scale the dial properly, the engineer must determine a linear function relating the amount A of chips coated per minute to the machine dial setting x.

a. Evaluate $A(0)$.
b. Evaluate $A(20)$.
c. Find the application domain of A.
d. Sketch a good graph of the function A.
e. Find the slope m of the function A.
f. Interpret the slope m of the function A using a complete sentence.
g. Derive the symbol rule for the function A.
h. Find the input to the function A that matches the output 190. Find this input using *both* graphical and analytical methods. How closely do the two inputs agree? Which method do you prefer?
i. Find the dial setting that coats 135 oz of chips per minute.

14. Match each of the following linear functions with its graph. All graphs have the same graphing window.

a. $y = 2x - 7$
b. $y = -3x + 3$
c. $y = x/2 + 5$
d. $y = 5x - 7$
e. $y = -x + 3$
f. $y = 4x + 5$

i.



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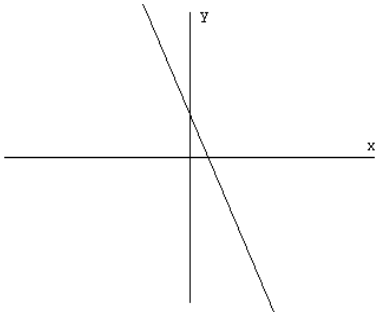

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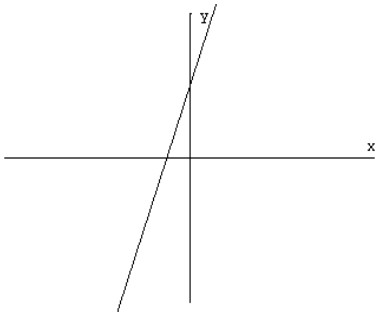

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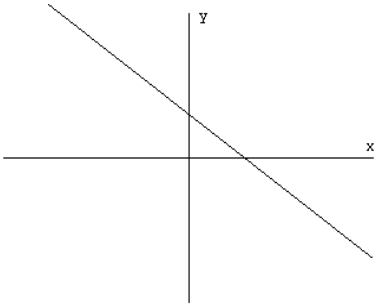

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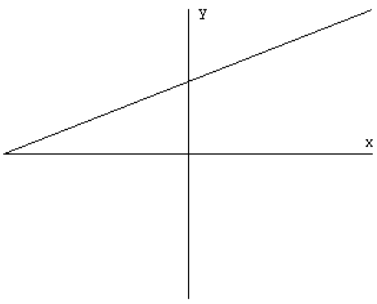
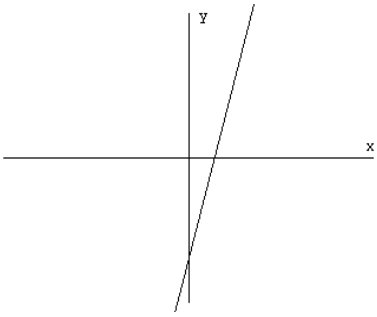
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