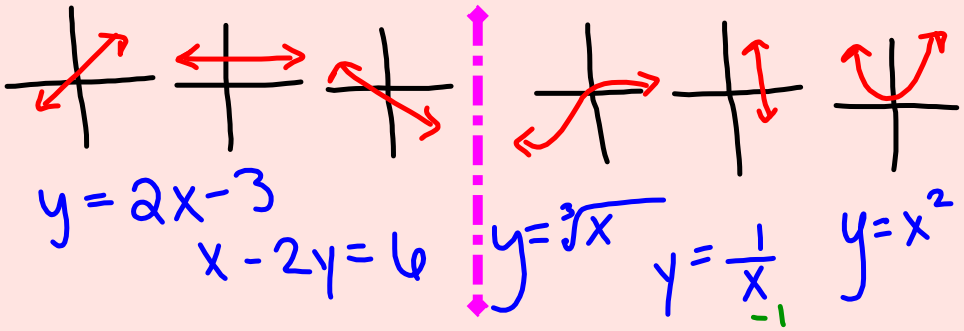
How do you determine key features of a linear function?

Linear Function

-graph is a non-vertical straight line

-changes by a constant amount over equal intervals



Intercepts

point where the line crosses the axis

$2x+3y=6$

x int ($y=0$)

$2x+3(0)=6$

$2x=6$

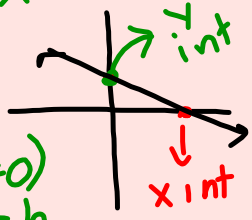
$x=3$ (3,0)

y int ($x=0$)

$2(0)+3y=6$

$3y=6$

$y=2$ (0,2)



$y=2x-3$

x int: $0=2x-3$

y int: $y=2(0)-3$

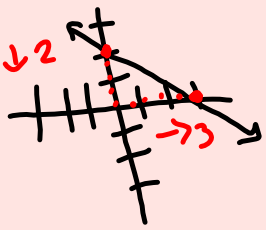
Slope

$m=\frac{y_2-y_1}{x_2-x_1}$; Rate of Change; $\frac{\text{Rise}}{\text{Run}}$

(3,0) (0,2)

x_1 y_1 x_2 y_2

$\rightarrow \frac{2-0}{0-3}=\frac{2}{-3}=-\frac{2}{3}$



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

*never leave ⊖ in denominator

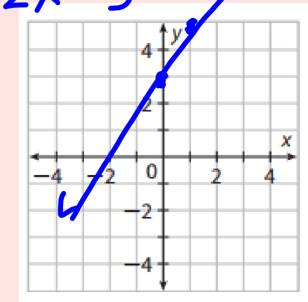
How is slope-intercept form useful?

Slope Intercept Form

$$y = mx + b$$

$y = 2x + 3$

1) plot **b**, the y-intercept → (0, 3)
2) MOVE according to **m** → $\frac{2}{1}$
-if it's a whole number, run 1
3) Use ruler/ ID to graph!



Write the equation of each line in slope-intercept form.

3. Slope is −1, and (3, 2) is on the line.

$m = -1$, (x, y)

$y = -1x + b$

$2 = -1(3) + b$

$2 = -3 + b$

$+3 \quad +3$

$5 = b$

$y = -x + 5$ (don't need to write 1)

4. The line passes through (1, 4) and (3, 18). x_1, y_1 x_2, y_2

1) find slope $\frac{18-4}{3-1} = \frac{14}{2} =$

2) plug in! (use 1 of the points)

$y = 7x + b$

$4 = 7(1) + b$

$4 = 7 + b$

$-7 \quad -7$

$-3 = b$

$y = 7x - 3$

How to convert to SI form

solve for y!

Write each equation in slope-intercept form. Then graph the line.

5. $2x + y = 4$

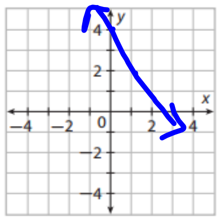
$2x + y = 4$

$-2x \quad -2x$

$y = -2x + 4$

· start (0, 4)

· move $\frac{-2}{1}$



6. $2x + 3y = 6$

$2x + 3y = 6$

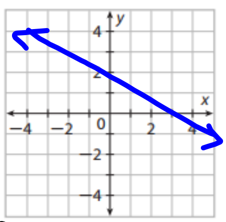
$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x + 6}{3}$

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

· start (0, 2)

· move $-\frac{2}{3}$



Identify the slope and *y*-intercept of the graph that represents the linear situation and interpret what they mean. Then write an equation in slope-intercept form and use it to solve the problem.

8. A local club charges an initial membership fee as well as a monthly cost. The cost *C* in dollars is a linear function of the number of months of membership. Find the cost of the membership after 4 months.

Membership Cost	
Time (months)	**Cost ($)**
0	100
3	277
6	454

3 } 177
3 } 177

$y = 59x + 100$

$59(4) + 100$

$\$336 = 236 + 100$

$b = 100$ initial cost

$\frac{177}{3} = 59 = m$ additional cost per month

How can you use intercepts to graph a linear equation?

Standard Form Ax + By = C

coefficients

How to convert to Standard Form

- -isolate c
- -get rid of fractions
- -make sure A is positive

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

$-\frac{2}{3}x \quad -\frac{2}{3}x$

$3\left(-\frac{2}{3}x + y = -3\right)$

$(-2x + 3y = -9)\cdot -1$

$2x - 3y = 9$

Find x & y intercepts!

How to graph:

x int

$2x - 3(0) = 9$

$2x = 9$

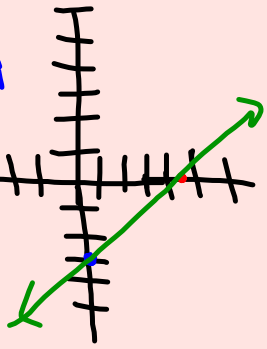
$x = 4.5$

y int

$2(0) - 3y = 9$

$-3y = 9$

$y = -3$



X = # chips y = # lollipops

$1x + 0.25y = 2$ (1, 4)

x int

$x + 0.25(0) = 2$

$x = 2$

y int

$1(0) + 0.25y = 2$

$0.25y = 2$

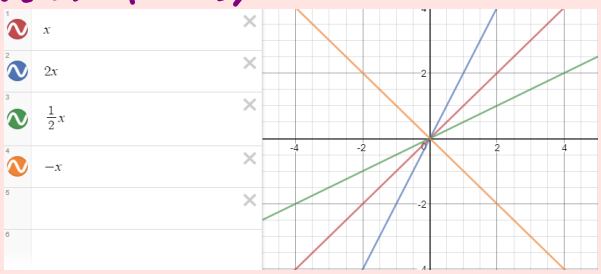
$y = 8$

How can you compare different types of functions?

Parameters	f(x)= a(bx - h) + k $y = mx + b$
Reflection	-f(x) OR f(-x) Vertical (across x axis) — horizontal (across y axis)
Vertical Stretch / Compression	af(x) if $a > 1$ – multiply output if $0 < a < 1$
Horizontal Stretch / Compression	f(bx) (opposite) if $0 < b < 1$ if $b > 1$ – multiply input (x) by $\frac{1}{b}$
Vertical Translation	f(x) + k up/down – add/sub to output
Horizontal Translation	f(x - h) (opposite) right/left – add/sub to input

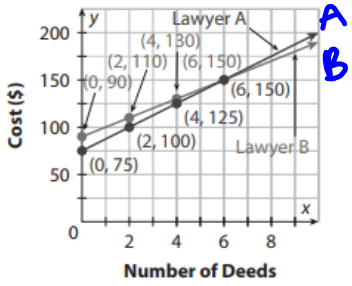
Constants that change a function

*For linear functions, they're the same



Lesson Performance Task

Laura wants to hire a lawyer to file deeds for some properties she owns. The graph illustrates costs for her two choices of lawyers. Using the points on the graph, construct a table of results and two equations. Which lawyer is a better choice for her if she has 8 deeds? Which lawyer is a better choice if she has 2 deeds? Why? Over the long run, which lawyer is more cost-effective?



Lawyer A

0	75
2	100
4	125
6	150

$y = \frac{25}{2}x + 75$

Lawyer B

0	90
2	110
4	130
6	150

$y = 10x + 90$

$A(x) = B(x)$