

### 3.1 Graphing Linear Equation

(new)

Day 1

Standard Form

$$Ax + By = C$$

A +

A & B cannot be fractions

C = constant

If you can put the equation in this form  
it is a line

$$y =$$
$$x =$$

are also lines

A & B can both  
be = 0

EX)  $y = 3x - 4$  lock at x + stays  
 $-y -y$  - moves

$$0 = 3x - y - 4$$
$$+y \quad +y$$

$$y = 3x - 4$$

$$3x - y = 4$$

A + ✓

A & B not Fred ✓

x & y on left ✓

constant on right ✓ SF

Incl

EX)  $\frac{1}{3}y = 1$   
 $y = 3$  ✓

EX)  $y = x^2 - 4$   
nc

EX)  $6 - xy = 4$   
→ not

3.1 Day 2

New

To Graph 2 ways x & y int & Chart

x intercept is where line crosses x axis

y intercept is where graph crosses y axis

to find

$$x=0 \quad y=? \quad \text{y int.}$$

$$y=0, \quad x=? \quad \text{x int.}$$

Ex)  $-x + 2y = 3$

$$x=0 \quad y=?$$

$$y=0, \quad x=?$$

$$-0 + 2y = 3$$

$$2y = 3$$

$$y = 3/2$$

$$(0, 3/2)$$

$$-x + 2(0) = 3$$

$$-x = 3$$

$$x = -3$$

$$(-3, 0)$$

Graph pls  
connect.

Ex)  $y = -x - 5$

$$x=0, \quad y=?$$

$$y=0, \quad x=?$$

$$y = -0 - 5$$

$$y = -5$$

$$(0, -5)$$

$$0 = -x - 5$$

$$\frac{5}{-1} = \frac{-x}{-1} \quad x = -5$$

Graph pls  
connect.  $(-5, 0)$

$$\begin{array}{c|c} x/y & \\ \hline 0 & \leftarrow y \text{ int} \\ \hline x \text{ int} & \rightarrow 0 \end{array}$$

Chart

Ex)  $y = 2x + 4$

x	0	1	2	3	4	5
y	4	6	8	10	12	14

Use Alg

Use pattern to

If you can-  
find the  
rest!

$x = 0$

$y = 2(0) + 4 = 4$

$x = 1$

$y = 2(1) + 4 = 6$

$x = 2$

$y = 2(2) + 4 = 8$

Graph

Ex)  $x + 4y = 8$

$x = 0$

x	0	1	2	3	4	5
y	2	1.5	1	0.5	0	

$x + 4y = 8$

$y = 2$

Graph

$x = 1$

$1 + 4y = 8$

$-1 \quad -1$

$\frac{4y}{4} = \frac{7}{4}$

$y = 7/4$

CDP 159, 5-11 odd

CW p. 159, 19-33 odd

HW p. 159, 20-34 even

Day 3.

CW 3.15P

HW 3.1P.

$x = 2$

$2 + 4y = 8$

$4y = 6$

$y = 3/2$

3.1 Day 3.

Graph using x &amp; y intercepts:

$x=0 \quad y=?$

$y=0 \quad x=?$

Ex)  $-x+2y=3$

$x=0, \quad y=?$

$y=0, \quad x=?$

$0+2y=3$

$2y=3$

$y=3/2$

$(0, 3/2)$

$-x+2(0)=3$

$-x=3$

$x=-3 \quad (-3, 0)$

Ex)  $y=-x-5$

$x=0 \quad y=?$

$y=0, \quad x=?$

$y=0-5$

$y=-5$

$(0, -5)$

$0=-x-5$

$5=-x$

$x=-5 \quad (-5, 0)$

CD p. 159, 5-7 odd

CW work x &amp; y into a

HW work x &amp; y into b

### 3.1 Day 4.

### Graphing Using Chart

x	0	1	2	3	4	5
y						

$x=0$                        $x=1$                        $x=2$                        $x=3$   
 $y=?$                                $y=?$                                $y=?$                                $y=?$  etc

Ex)  $y = 2x + 4$

x	0	1	2	3	4
y	4	6	8	10	12

Graph.

$x=0$                        $x=1$                        $x=2$   
 $y=4$                                $y=6$                                $y=8$

Ex)  $x + 4y = 8$

x	0	1	2	3	4
y	2	$7/4$	$3/2$		1

Graph

$4 + 4y = 8$   
 $4y = 4$   
 $y = 1$

CD p. 159, 9-11  
 CW chart a  
 HW chart b

Day 5 CD p. 160, 29-34  
 CW 3.1 SP  
 HW 3.1 P

## 3.2 Solving linear Equations by Graphing

Algebraically

$$2x + 4 = 8$$

$$-4 \quad -4$$

$$\frac{2x}{2} = \frac{4}{2} \quad x = 2$$

Graphically

$$2x + 4 = 8$$

$$-4 \quad -4$$

$$2x - 4 = 0$$

Replace  $4$  with  $4$ 

$$y = 2x + 4$$

Graphs  $x$  or  $y$  int marked

$$y = 2x + 4$$

$x$	0	1	2	3	4
$y$	4	6	8	10	12

See where graph crosses  $x$  axis

this is called the solution or

 $x$  value

or 0!

 $y = 2x + 4$  linear function.

$$f(x) = y$$

 $y = x$  is called the parent function.

Check answer using Algebra

White Boards

$$3x - 6 = 0$$

$$y = 3x - 6$$

x	0	1	2	3	4
y	-6	-3	0	3	6

Graph (add more pts as needed)

Check using Als

$$3x - 6 = 0$$

$$3x = 6$$

$$x = 2 \checkmark$$

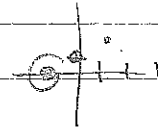
$$\text{Ex) } x + 5 = 4$$

$$\quad -4 \quad -4$$

$$x + 1 = 0$$

$$y = x + 1$$

x	0	1	2	3	4
y	1	2	3	4	5



$$x + 5 = 4$$

$$x = -1$$

CD Solving inequ  
HW Solving b.

Day 2

Steps 1) Get equation = 0

2) Replace 0 w/ y

3) Make chart

4) Graph

5) Note where graph crosses x axis

called answer or zero

6) Check algebraically

CD p. 166, 112, 10, 11

CD Worksheet 3.2a

HW Worksheet 3.2b

### 3.3 Rate of Change and Slope

$$\text{Rate of change} = \frac{\text{change in } y}{\text{change in } x}$$

Chart

x	y
2	76
4	152
6	228

x	2	4	6
y	76	152	228

Ordered pair (2, 76)  
(4, 152)  
(6, 228)

$$\text{Rate of change} = \frac{\text{Change in } y}{\text{Change in } x}$$

$$\frac{152 - 76}{4 - 2}$$

$$\text{or } \frac{228 - 152}{6 - 4} \quad \text{or } \frac{228 - 76}{6 - 2}$$

$$\frac{76 - 38}{2} = 38$$

$$\frac{76}{2}$$

$$\frac{76}{2}$$

(See Ex 3)

or look for

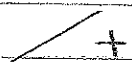
same for both?

you must do every value!

If rate of change is constant  $\rightarrow$  linear function  
not constant it's not a linear function

$$\text{slope is a rate of change} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Same as above!



horizontal line  
0 slope

vertical  
line  
undefined  
slope



1) Name pts  $(x_1, y_1)$   $(x_2, y_2)$

2) Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

3) Plug in #

4) Value      whole # or fraction

No decimals!

Ex  $(2, 4)$   $(6, 8)$   
 $x_1, y_1$   $x_2, y_2$

Ex  $(-2, 4)$   $(6, -8)$   
 $x_1, y_1$   $x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 4}{6 - 2} = \frac{4}{4} = 1$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8 - 4}{6 - (-2)} = \frac{-12}{8} = -\frac{3}{2}$$

Ex  $(2, 8)$   $(4, 8)$   
 $x_1, y_1$   $x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 8}{4 - 2} = \frac{0}{2} = 0 \text{ slope}$$

horizontal line

Ex  $(3, 5)$   $(3, 7)$   
 $x_1, y_1$   $x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 5}{3 - 3} = \frac{2}{0} = \text{undefined slope}$$

vertical line

$$\text{Ex) } (6,3) (r,2) \quad m = \frac{1}{2}$$

$x_1, y_1 \quad x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-3}{r-6} = \frac{-1}{r-6}$$

$$1(r-6) = -2$$

$$r-6 = -2$$

$$\boxed{r=4}$$

CD p. 177 1-13

CLW p. 177, 15-39 odd

Finish for HW

Day 2 CD wksh + 3.3e slope on a graph

CLW p. 177, 14-38 even

HW 3.3 SP + P

### 3.4 Direct Variation

A direct variation is described by

$$y = kx$$

where  $k$  is the constant of variation

or  
constant of proportionality

$$y = kx \quad y = mx \quad m = k$$

Use Graph to find slope

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

↑  
→ -  
↓ -  
← -

to Graph - use a chart

$$y = -2x$$

x	0	1	2	3	4	5
y	0	-2	-4	-6	-8	-10

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

x	0	2	4	6	8	10
y	0	-3	-6	-9	-12	-15

To solve a direct variation.

$y$  varies directly to  $x$

$$y = kx$$

$$y = 98 \text{ when } x = 14$$

$$98 = k(14)$$

$$\frac{14k = 98}{14 \quad 14} \quad k = 7$$

$$y = 7x$$

Find  $y$  when  $x = -4$

$$y = 7(-4) = -28$$

CD p. 185, 1-8

Cwp. 185, 11-27 odd

HW p. 185, 10-28 even

Day 2

CW SP

HW P

### 3.5 Arithmetic Sequence + Linear Function Day 1

A sequence is a set of #'s  $\Rightarrow$   
terms of sequence

1st:

If the difference is constant  $\Rightarrow$  CD.  
Arithmetic Sequence

We use these patterns to predict  
future answers

Ex) 1, 3, 5, 7, 9, ...  $\swarrow$  ellipsis  
+2 +2 +2 +2  $\leftarrow$  CD  
11, 13, 15

Ex) 32, 30, 28, 26, ...  
CD  $\rightarrow$  -2 -2 -2      24, 22, 20

Ex) 1, 5, 11, 19, 29, ... 41, 55, 71  
+4 +6 +8 +10 +12 14 16  
2nd  $\rightarrow$   $\swarrow$   $\swarrow$   $\swarrow$   $\swarrow$   $\swarrow$   $\swarrow$   
diff +2 +2 +2 +2 +2 +2

Ex, 2, 4, 8, 16, 32, ...      Not an arithmetic  
       $\cdot 2 \cdot 2 \cdot 2$       64, 128, 256      Sequence

CD p. 193, 1-4  
CW p. 193, 8-17

New old book: 1. 1-2 only

### 3.5 Day 2

Ex) 8, 11, 14, 17  
 $+3+3+3 \in CD$

This can be expressed using  $a_1$  as the 1st term  
 $d$  CD as  $d$

			Ex
1st term	$a_1$	$a_1$	8
2nd term	$a_2$	$a_1 + 1d$	$8 + 1(3) = 11$
3rd term	$a_3$	$a_1 + 2d$	$8 + 2(3) = 14$
4th term	$a_4$	$a_1 + 3d$	$8 + 3(3) = 17$
$n^{\text{th}}$ term	$a_n$	$a_1 + (n-1)d$	$8 + (n-1)3$

100<sup>th</sup> term = 305

$$8 + 3n - 3 =$$

$$a_n = 5 + 3n$$

What is the 12<sup>th</sup> term?

$$a_{12} = 5 + 3(12)$$

$$= 5 + 36 = 41$$

Ex) 1, 10, 19, 28  
 $+9+9+9 \in CD$

$$a_1 + (n-1)d$$

$$1 + (n-1)(9)$$

$$1 + 9n - 9$$

$$a_n = 9n - 8 \in \text{equation for}$$

12<sup>th</sup> term  $a_{12} = 9(12) - 8$   
 $= 100$

arithmetic  
sequence

Graph pts

$(n, a_n)$

- (1, 1)
- (2, 10)
- (3, 19)
- (4, 28)

$$a_n = a_1 + (n-1)d$$

GP: 3A1

Ex)  $3, -10, -23, -36$   
 $-13$

$$a_n = 3 + (n-1)(-13)$$

$$= 3 - 13n + 13$$

a)

$$a_n = 16 - 13n$$

b) 15<sup>th</sup> term

$$a_{15} = 16 - 13(15)$$

$$= 16 - 195$$

$$= -179$$

$$(1, 3) \quad (2, -10) \quad (3, -23) \quad (4, -36)$$

What if I want to find what term = -114

$$a_n = a_1 + (n-1)d$$

or in our case

$$a_n = 16 - 13n$$

$$-114 = 16 - 13n$$

$$\begin{array}{r} -114 \\ -16 \quad -16 \\ \hline \end{array}$$

$$-130 = -13n$$

$$n = 10$$

$$\begin{array}{r} -130 \\ -13 \quad -13 \\ \hline \end{array}$$

CDP. 193, 5, 6

Cwp. 193, 18-21

Hw 3, 5 SP4P

### 3.6 Proportional & Nonproportional Relationships

$$y = 2x + 8$$

Chart to equation

x	0	1	2	3	4	5
y	8	10	12	14	16	18

$CD = 2$

note  $m = 2$   $CD = 2$  Equation to Chart

$$y = mx + b$$

note

x	0	1	2	3	4	5
y	b					

$m = CD$

x	0	1	2	3	4	5
y	4	6	8	10	12	

$CD = 2$

$$y = 2x + 4$$

x	0	1	2	3	4	5
y	5	3	1	-1	-3	-5

$$y = -2x + 5$$

CD Ex 1 p. 198

no b! dissolve under 0!

Add 0 & write equation

x	0	1	2	3	4	5
y		9	12	15	18	

$$y = 3x + 6$$



$$y = f(x)$$

function notation =  $f(x)$

Given Graph  $y = mx + b$

$m = \text{slope}$

$b = y\text{-intercept}$

1) Find  $b$

2) Find  $m$

3)  $y = mx + b$

$b = 0$  proportional relationship  $y = kx$

$b \neq 0$  nonproportional relationship

Solve some way!

CD p. 200 1-3

CWp 200 4-13

HW 3.6 SPSP