Ways to represent a relation or function

Table or List of ordered pairs

EX.

x	y
0	1
1	3
2	5
3	7

Equation or Rule

EX. ① Linear function $y = 2x + 1$

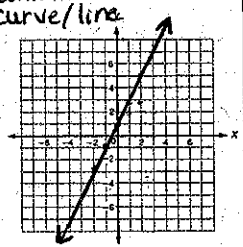
② Non-linear $y = x^2$

③ Not a function $x^2 + y^2 = 16$

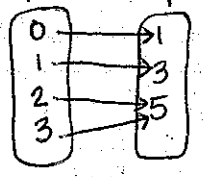
Graph

Discrete domain? See points

Continuous domain? curve/line



Mapping diagram



Function: a relation where each input has exactly one output.

Domain: the set of all inputs (x's), independent variable

Range: the set of all outputs (y's), dependent variable

Vertical Line Test (use on graph) - if any vertical line passes through more than 1 point at the same time => NOT a function.

Function Notation

$y = f(x)$ ← another output name

$f(x) = -2x + 1$

Find $f(-2)$ means find output when $x = -2$.

Ex. $f(-2) = -2(-2)+1 = 4+1 = 5$ $(-2, 5)$

Find x when $f(x) = -9$ means find input when $y = -9$.

$-9 = -2x + 1$

$-10 = -2x$

$5 = x$ $(5, -9)$

Graphing Lines:

Horizontal line

O = slope

Y = #

Vertical line

Undefined slope

X = #

→ solve for y

Slope-Intercept Form

$y = mx + b$

"y is a function of x"

1. Plot (0, b) y-intercept
2. Use slope → count rise and then run to plot 2 additional points.
3. Connect points with line - remember arrows.

Standard Form

$Ax + By = C$

(0, y) (x, 0)

1. Find x-int, let y=0 and solve for x.
2. Find y-int, let x=0 and solve for y.
3. Connect points with a line, remember arrows.

Use when C ÷ by A & B.

Point-Slope Form

$y - y_1 = m(x - x_1)$

1. Plot the point (x_1, y_1)
2. Use slope → count rise and then run to plot 2 additional points.
3. Connect points with line - remember arrows.

Numerical TABLE

(when other methods don't work)

1. Create x-y table
2. Look at domain. Restricted?
3. Choose 3 easy x's (one +, one -, one zero - if in domain)
4. Plot points and connect if necessary.

Slope = m

Rise rhymes with y's!

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope = constant rate of change

Classify lines using slope:

negative slope → falling line

positive slope → rising line

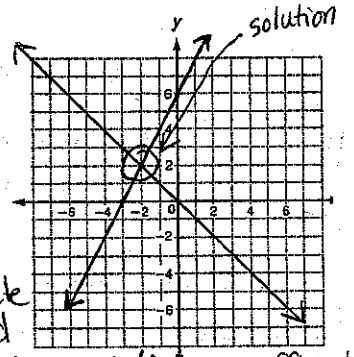
Parallel and Perpendicular Slopes

Parallel Slopes – ∥ lines have the same slope

Perpendicular Slopes – ⊥ lines have slopes that are opposite reciprocals ~ product of slopes = -1

Solving Linear Systems

Solution: an ordered pair (x, y) that makes all equations true. Always check!!



Methods:

Graphing- Graph both lines and find intersection point.

Substitution- Solve for 1 variable. Substitute expression into other equation and solve for remaining variable. Use when -1/1 is coefficient.

Elimination- Multiply so that one variable has opposite coefficients. Add to eliminate variable and solve for remaining variable. Use in standard form.

Linear Functions and Absolute Value Functions Review Name: 2018-2019 Key

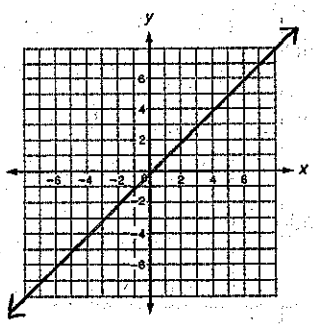
Transformations			Transformation	Key points
Reflections	Vertical	$-f(x)$	Reflection over the x-axis. Take the opposite of the y's	
	Horizontal	$f(-x)$	Reflection over the y-axis. Take the opposite of the x's.	
Stretches/Compressions	Vertical	$af(x)$	$\lvert a\rvert>1$ vertical stretch $0<\lvert a\rvert<1$ vertical compression.	Multiply y by $\lvert a\rvert$
	Horizontal	$f(ax)$	$\lvert a\rvert>1$ horizontal compression $0<\lvert a\rvert<1$ horizontal stretch	Divide x by $\lvert a\rvert$
Shifts	Vertical	$f(x)+k$	$k>0$, see +, shift up $k<0$, see −, shift down	Add to y
	Horizontal	$f(x-h)$	$h>0$, see −, shift right $h<0$, see +, shift left	Subtract from x

Linear Functions Parent: $y=x$, $f(x)=x$

$y=mx+b$

Key points

x	y
−1	−1
0	0
1	1



If $m>0$, rising line.
If $m<0$, falling line, reflection
If $\lvert m\rvert>1$: vertical stretch: steeper line
If $\lvert m\rvert<1$: vertical compression. flatter line.
If $b>0$, shift up. If $b<0$, shift down.

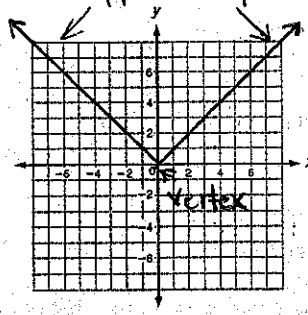
Remember: subtraction = adding the opposite
division = multiply by the reciprocal

Absolute Value Functions Parent: $y=\lvert x\rvert$, $f(x)=\lvert x\rvert$

$y=a\lvert x-h\rvert+k$

Key points

x	y
−1	1
0	0 vertex
1	1



$(h,k)\rightarrow$ vertex
If $a>0$, opens up.
If $a<0$, opens down, reflection over the x-axis.
If $\lvert a\rvert>1$, narrower V, vertical stretch.
If $\lvert a\rvert<1$, wider V, vertical compression.
If $h>0$, see −, shift right.
If $h<0$, see +, shift left.
$k>0$, see +, shift up
$k<0$, see −, shift down

$\lvert x-\text{given value}\rvert=ab$.
ideal or avg. deviation: error

Get $\lvert ax+b\rvert$ alone and then SPLIT!

When solving inequality with absolute value?
$<, \leq \rightarrow$ split to "and"
$>, \geq \rightarrow$ split to "or"

Solving Equations and Inequalities

Always simplify before you solve

1. Distribute to get rid of parentheses.
2. Combine like terms
   Simplify then → Solve
3. Move variables to one side
4. Use properties of equality/inequality to get variable alone.
   (a) Undo +/− first
   (b) Undo ·/÷ second