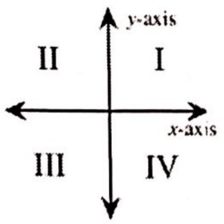
CC Algebra 1 Name Cori's per ______

Mastery Checkpoint Basic Skills Toolkit

Axes, Quadrants & Coordinates

4-quadrant graph:

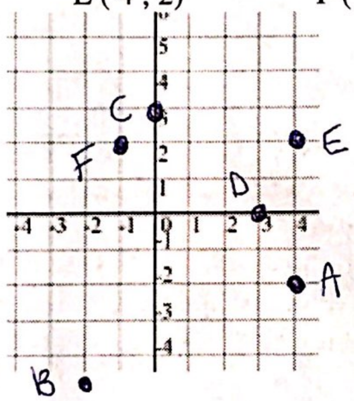


COORDINATES /ORDERED PAIR: (x , y)

Plot the points with the following coordinates:

A(4 , -2) B (-2, - 5) C (0, 3)

D(3, 0) E (4 , 2) F (-1, 2)



Working with Fractions

To add and subtract fractions use a common denominator

$\frac{3}{5}+\frac{7}{100}=$

$\frac{3}{5}\cdot\frac{20}{20}=\frac{60}{100}$

$+\frac{7}{100}$ $\frac{7}{100}$ 67

$\boxed{67/100}$

$\frac{2}{3}-\frac{5}{8}=$

$\frac{2}{3}\cdot\frac{8}{8}$ $\frac{16}{24}$

$-\frac{5}{8}\cdot\frac{3}{3}$ $\frac{-15}{24}$ 1

$\boxed{\frac{1}{24}}$

$2\frac{1}{4}-\frac{7}{12}$

$\frac{9}{4}-\frac{7}{12}$

$\frac{9}{4}\cdot\frac{3}{3}\ \frac{27}{12}$

$-\frac{7}{12}\ -\frac{7}{12}$

$=\frac{20}{12}\div\frac{4}{4}=\boxed{\frac{5}{3}}$

To multiply fractions Multiply straight across then simplify

$\frac{3}{5}\bullet\frac{7}{100}=\boxed{\frac{21}{500}}$

$\frac{2}{3}\bullet\frac{5}{8}=\frac{10}{24}\div\frac{2}{2}=\boxed{\frac{5}{12}}$

$6\frac{1}{8}\left(\frac{9}{11}\right)$

$\frac{49}{8}\cdot\frac{9}{11}=\boxed{\frac{441}{88}}$

To divide fractions multiply by the reciprocal, then simplify

$\frac{3}{5}\div\frac{7}{100}=$

$\frac{3}{5}\bullet\frac{100}{7}=\boxed{\frac{60}{7}}$

$\frac{2}{3}\div\frac{5}{8}=$

$\frac{2}{3}\bullet\frac{8}{5}=\boxed{\frac{16}{15}}$

$15\frac{3}{4}\div\left(-\frac{1}{12}\right)$

$\frac{63}{4}\bullet\left(-\frac{12}{1}\right)=\boxed{\frac{-189}{1}}$

Find the LCD of:

3 and 4 = $\boxed{12}$ 2 and 7 = $\boxed{14}$ 6 and 8 = $\boxed{24}$

Adding & Subtracting Integers

Adding:

SAME signs: add and keep same sign

6 + 1 = 7 - 3 + (-7) = -10

DIFFERENT signs:

Subtract and keep sign of larger digit.

-3 + 8 = 5 1 + (-4) = -3

Subtracting: "Add the opposite"

Change subtraction symbol to addition and switch sign of second number, then follow rules for adding.

+ 5 − 9 = -4 2 - (-3) = 5 -4 − 1 = -5

5 + (-9) 2+3 -4 + (-1) = -5

Multiplying & Dividing Integers

If signs are the same, the answer is positive

If signs are different, the answer is negative

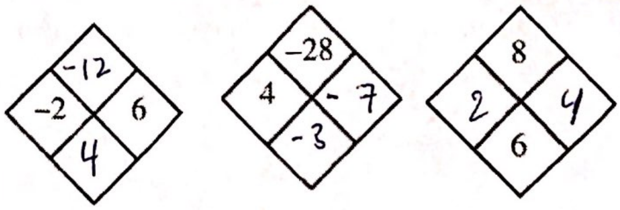
$-20\div 2=$ -10 $-15\div(-5)=$ 3

$7\bullet(-3)=$ -21 $-5\bullet(-10)=$ 50

Diamond Problems

Number on top is the product of side numbers

Number on bottom is the sum of the side numbers.



Word Problem Vocabulary

Translate the following into math expressions:

+ Add

x increased by 8 $x+8$

The total of m and 9 $= m+9$

- Subtract/Minus

6 less x $6-x$

6 less than x $x-6$

× ( ) Multiply

the product of x and 5 $x \cdot 5$ or $5x$

6 more than twice x $2x+6$

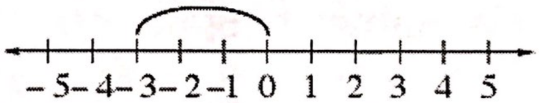
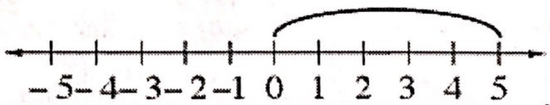
triple the difference of 10 and w $3(10-w)$

÷ Divide

the quotient of x and 7 $\frac{x}{7}$

Absolute Value

Absolute Value represents the numerical value of a number without regard to its sign. The symbol for absolute value is two vertical bars, $|\ \ |$. Absolute value can represent the **distance** on a number line between a number and zero. Since a distance is always positive, the absolute value is *always* either a positive value or zero. The absolute value of a number is *never* negative.

For example, the number –3 is 3 units away from 0, as shown on the number line at right. Therefore, the absolute value of –3 is 3. This is written $\|-3\|=3$.	distance of 3 
Likewise, the number 5 is 5 units away from 0. The absolute value of 5 is 5, written $\|5\|=5$.	distance of 5 

Solving equations with absolute value:

a. $|-100|-98$ $100-98=\boxed{2}$

b. $|6-11+3|=$ $|-2|=\boxed{2}$

c. $-9-|-2|$ $-9-(2)=\boxed{-11}$

d. $5|6|-2$ $5(6)-2=30-2=\boxed{28}$

e. $2\div|3-4|$ $2\div|-1|=2\div1=\boxed{2}$

f. $11|-6|+15$ $11(6)+15=66+15=\boxed{81}$

Radical Expressions

Square root is a number multiplied by itself two times. There is an invisible "2" in the symbol notation.

a. $\sqrt{18}\approx4.2$ $\sqrt{9}\sqrt{2}=\boxed{3\sqrt{2}}$

b. $\sqrt{9}=\boxed{\pm3}$

c. $-11-\sqrt{16}$ $-11-4=\boxed{-15}$

d. $\sqrt{144}=\boxed{\pm12}$

e. $\sqrt{3^2}=\boxed{3}$

The solution to the equation $x^3=64$ is called the **cube root** of 64. The idea is similar to the idea of a square root, except that the value must be cubed (multiplied by itself three times) to become 64. One way to write the cube root of 64 is using the notation $\sqrt[3]{64}$. Use this information to evaluate each of the following expressions.

$\sqrt[3]{64}=\boxed{4}$ b. $\sqrt[4]{16}=\boxed{2}$ c. $\sqrt[3]{-8}=\boxed{-2}$ d. $\sqrt[3]{125}=\boxed{5}$ e. $\sqrt[3]{27}=\boxed{3}$ f. $-19+\sqrt[3]{-8}$

$-19-2=\boxed{-21}$

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Mastery Checkpoint 1: Functions Toolkit

Functions

A relationship between inputs and outputs is called a **function** if the inputs and outputs behave like a soda machine that is functioning properly.

Output f(x) y **Input** X

ALL functions have only output for every input.

Tables

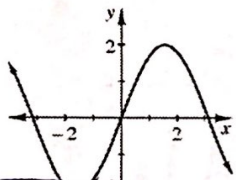
x	–3	–2	–1	0	-2	5	3
y	0	3	5	7	-3	9	13

NF

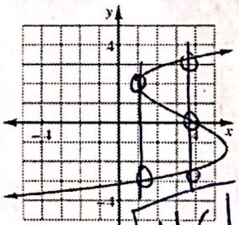
x	y
-3	8
-2	-2
3	0
4	-5
-5	-2

Function

Graphs



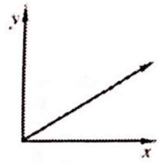
Function



Nf

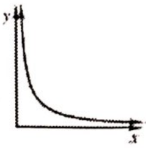
Families of Relations

There are several "families" of special functions that you will study in this course. One of these is called **direct variation** (also called **direct proportion**) which is a **linear** function. The data you gathered in the "Sign on the Dotted Line" lab (in problem 1-9) is an example of a linear relation.



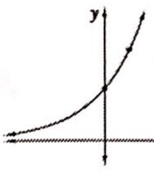
Linear

Another function is **inverse variation** (also called **inverse proportion**). The data collected in the "Hot Tub Design" lab (in problem 1-9) is an example of inverse variation.



Inverse Variation

You also observed an **exponential** function. The growth of infected people in the "Local Crisis" (in problem 1-9) was exponential.



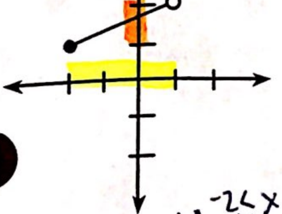
Exponential

In FUNCTIONS OF AMERICA (1-23) you studied equations that create a family of functions called **quadratics**. The graph of a quadratic function has the shape of a **parabola**. The exponent of 2 determines this curved shape. $y = x^2 - 4x + 5$

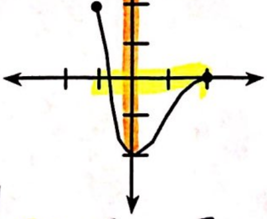
Domain and Range

The set (collection) of numbers that can be used for x in a function and still get an output is called the **domain** of the function. The domain is a description or list of all the possible x-values for the function.
Range: The possible outputs (y-values) is called the **range** of the function.
Describe the domain and range of each function below.

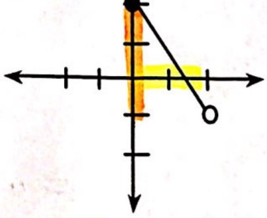
a.



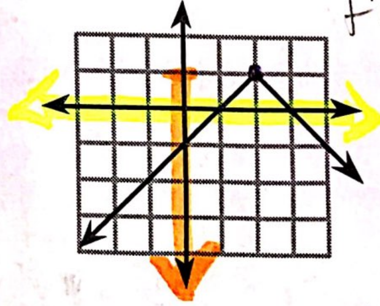
b.



c.



d. $f(x)=-1|$



a. **D:** [-2, 1) $-2 \le x < 1$
R: [1, 2) $1 \le y < 2$

b. **D:** [-1, 2] $1 \le x \le 2$
R: [-2, 2] $-2 \le y \le 2$

c. **D:** [0, 2) $0 \le x < 2$
R: (-1, 2] $-1 < y \le 2$

d. **D:** $(-\infty, \infty)$ ℝ all real #s
R: $(-\infty, 1]$ $-\infty < y \le 1$

Working with Relations

What value is not part of the domain of the function $f(x)=\frac{1}{x-4}$? Why? Explain completely why it is ***excluded.*** $x \neq 4$ because it would equal $\frac{1}{0}$ = undefined

Find the missing inputs or outputs. If no input or output is possible, explain why not. Show all work

3.

$x=-2$

$f(x)=-|x-2|$

$f(x)=\boxed{-4}$

$-|-2-2|$

$-|-4|$

$-(4)$

4.

$x=$

$f(x)=x^3$

$f(x)=8$

$X=2$

$(2)^3=8$

$\sqrt[3]{8}=2$

Evaluating Expressions

For $f(x)=\sqrt{2x-8}$, evaluate each of the following.

a. $f(12)$ $=4$

$f(12)=\sqrt{2(12)-8}$

$=\sqrt{24-8}=\sqrt{16}=\boxed{4}$

b. $f(6)$ $=2$

$f(6)=\sqrt{2(6)-8}$

$=\sqrt{12-8}=\sqrt{4}=\boxed{2}$

c. $f(4)$ $=0$

$f(4)=\sqrt{2(4)-8}$

$=\sqrt{8-8}$

$=\sqrt{0}=\boxed{0}$

d. $f(0)$ =

no solution

(can't take $\sqrt{-8}$.)

Order of Operations

Mathematicians have agreed on an **order of operations** for simplifying expressions.

Original expression:	$(10-3\cdot2)\cdot2^2-\frac{13-3^2}{2}+6$
Circle expressions that are grouped within **parentheses** or by a **fraction bar**	$(10-3\cdot2)\cdot2^2-\frac{13-3^2}{2}+6$
Simplify *within* circled terms using the order of operations Evaluate **exponents.**	$(10-3\cdot2)\cdot2^2-\frac{13-3\cdot3}{2}+6$
Multiply or divide from **left to right**	$(10-6)\cdot2^2-\frac{13-9}{2}+6$
Combine terms by adding or subtracting from **left to right.**	$(4)\cdot2^2-\frac{4}{2}+6$
Circle the remaining terms:	$4\cdot2^2-\frac{4}{2}+6$
Simplify *within* circled terms using the order of operations as above.	$4\cdot2\cdot2-\frac{4}{2}+6$ $16-2+6$ 20 division first, then multiply! left to right

a. $3\cdot(-8-2)-(6\cdot3)+12=$

$3(-10)-18+12$

$-30-18+12=\boxed{-36}$

b. $\dfrac{-4+6(8-3)}{2\bullet3-6\bullet8}=$

30

$\dfrac{-4+6(5)}{6-48}=\dfrac{+26}{-42}\div\dfrac{2}{2}=\dfrac{+13}{-21}=\boxed{\dfrac{13}{21}}$

c. $15\div3\cdot4-(8-6)^2+6$

$5\cdot4-(2)^2+6$

$20-4+6=\boxed{22}$