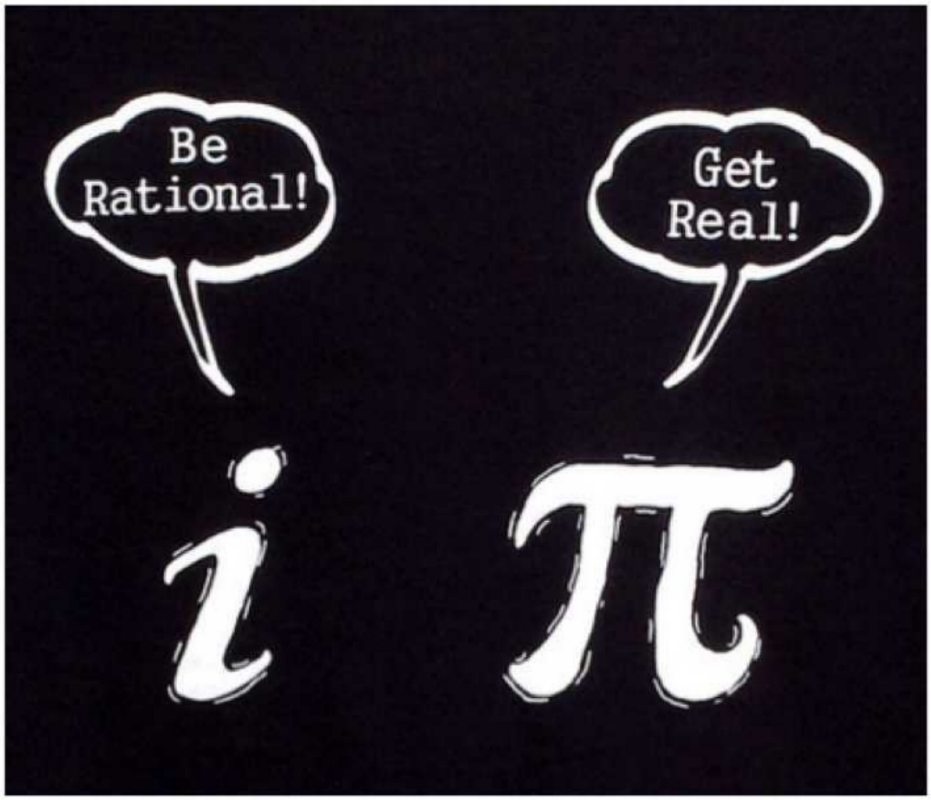
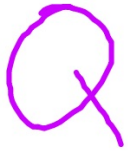
Number Sets, Set & Interval Notation



*See printout.

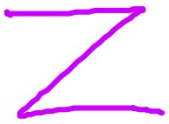
Number Set	Symbol	Definition
Real		A real number is a value that can be represented as a quantity on a continuous number line.

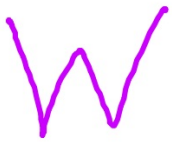
*See printout.

Number Set	Symbol	Definition
Rational		A rational number is any quantity that can be expressed as the ratio of two integers. Ex: 4(since $4=\frac{8}{2}$), 1.2 (since $1.2=\frac{12}{10}=\frac{6}{5}$), $-\sqrt{9}$ (since $-\sqrt{9}=-3=\frac{-3}{1}$, *etc.*)

Number Set	Symbol	Definition
Irrational	$\mathbb{I}$	An irrational number is any quantity that can NOT be expressed as a fraction (any nonrepeating & nonterminating decimal) Ex: π , e , $\sqrt{2}$

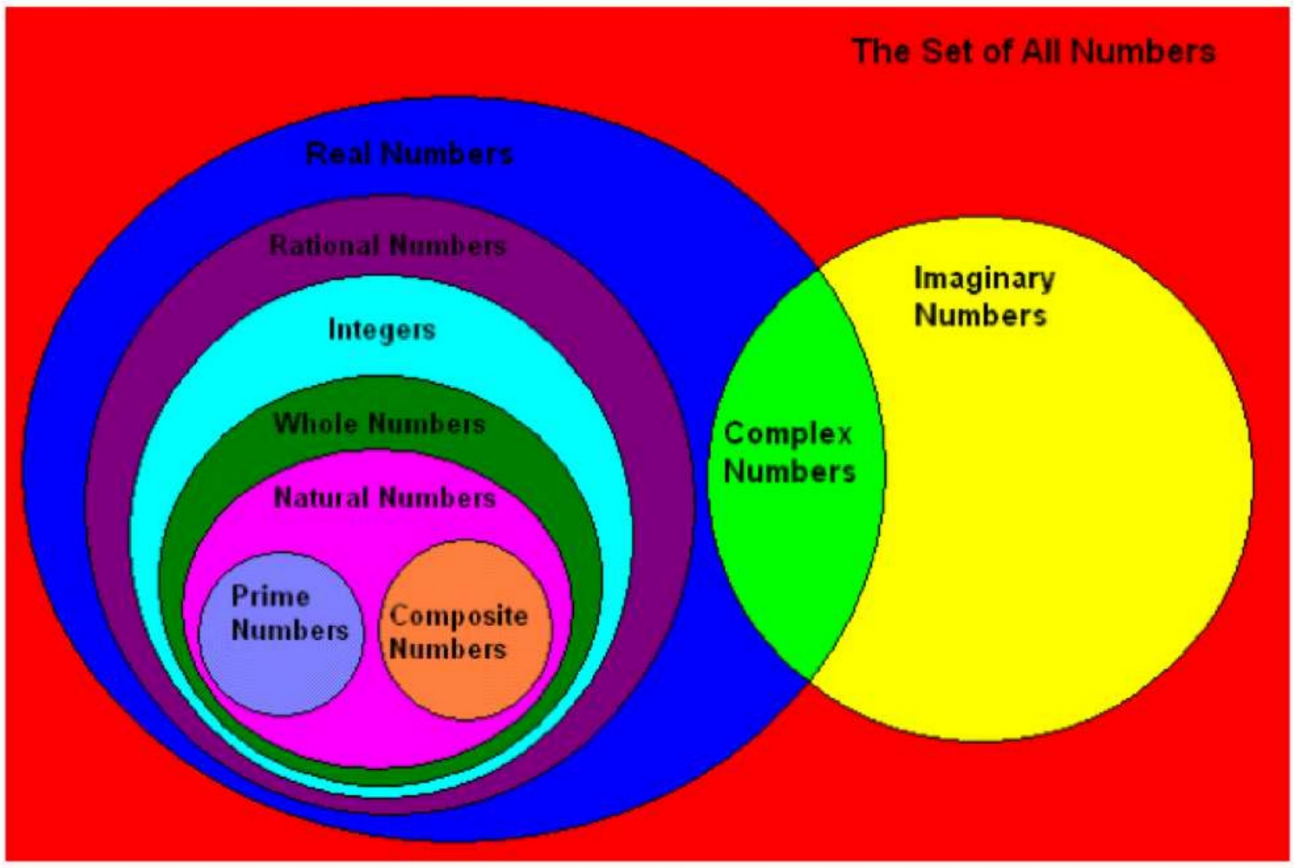
≈ 3.14 ≈ 2.72

Number Set	Symbol	Definition
Integers		The set of integers contains whole numbers, negative whole numbers and zero. {...-3, -2, -1, 0, 1, 2, 3...}

Number Set	Symbol	Definition
Whole		Whole numbers are nonnegative integers {0, 1, 2, 3…}

Number Set	Symbol	Definition
Natural		Natural numbers are positive integers. This set is commonly referred to as the "counting" numbers set. {1, 2, 3...}

Number Set	Symbol	Definition
Digits		A digit is any number that can be found in a phone number. {0, 1, 2...9}


The Set of All Numbers
Real Numbers
Rational Numbers
Integers
Whole Numbers
Natural Numbers
Prime Numbers
Composite Numbers
Complex Numbers
Imaginary Numbers

ex 1: List all sets to which each number belongs.

a) 2 ℝ, ℚ, ℤ, 𝕎, ℕ, 𝔻

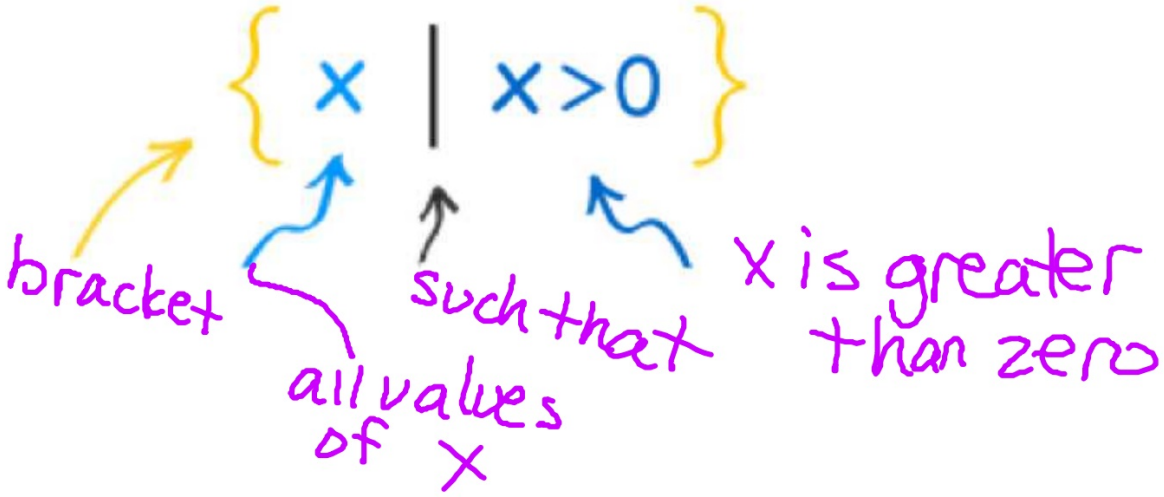
b) $\sqrt{4}-\sqrt{9}$ -1 ℝ, ℚ, ℤ,

c) $\pi(3)^2$ 9π ℝ, 𝕀,

d) $\sqrt{-4}$ none

Set & Interval Notation

Set Notation - A Set is a collection of things (usually numbers). Example: {5, 7, 11} is a set. But we can also "build" a set by describing what is in it. Here is a simple example of set-builder notation:



ex 2: Express each set of numbers in set notation.

a) $n \leq 40$

$\{n \mid n \leq 40\}$

b) domain: the set of real numbers

$\{x \mid x \in \mathbb{R}\}$

$\in$ element of

c) range: the set of integers

$\{y \mid y \in Z\}$

d) $3x+4 \neq \frac{1}{2}$

$\{x \mid x \neq -\frac{7}{6}\}$

2

$6x + 8 \neq 1$

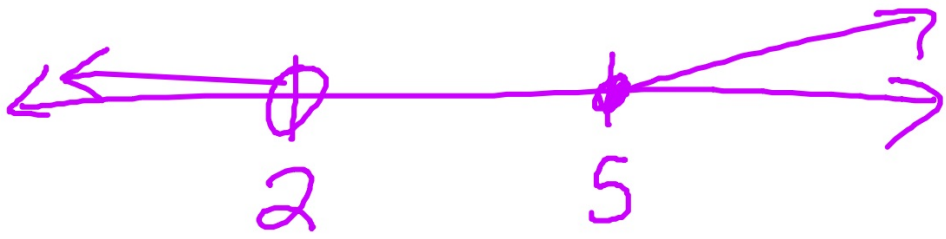
$6x \neq -7$

$x \neq -7/6$

e) $z < 2$ or $z \geq 5$

$\{z \mid z < 2 \text{ or } z \geq 5\}$

f) $z < 2$ and $z \geq 5$



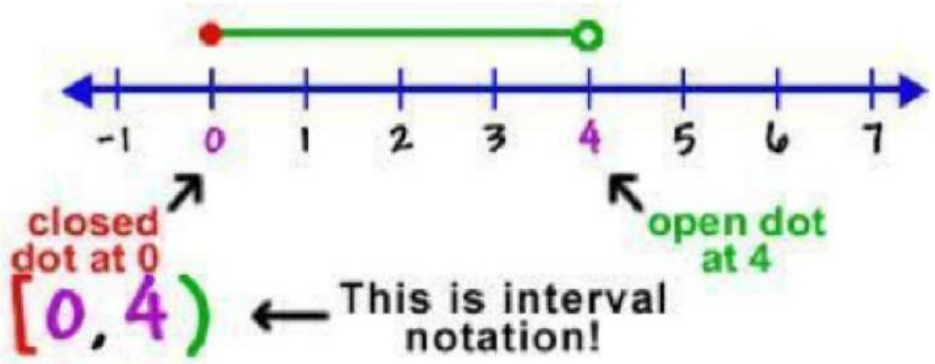
{ } or $\emptyset$

g.) $z > 2$ and $z \leq 5$

$\{z \mid 2 < z \leq 5\}$

Interval Notation - A notation for representing an interval as a pair of numbers. The numbers are the endpoints of the interval.

*Parentheses and/or brackets are used to show whether the endpoints are excluded or included.



Parentheses, ( ), indicate a quantity is not included.

Brackets, [ ], indicate a quantity is included.

When using infinity or negative infinity always use parentheis

Examples of interval notation:

$(1,3)$

$\left[-\frac{1}{2},0\right]$

$(-4,7]$

$[5,6)$

$(1,\infty)$ ← $\{x|x>1\}$

$(-\infty,0]$

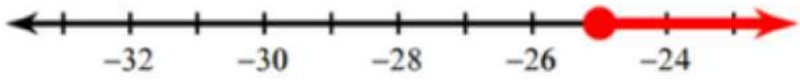
ex 3: Express each set of numbers in interval notation.

a) 

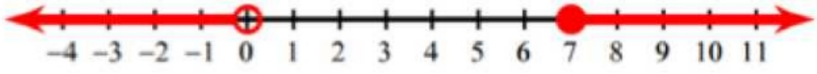
$[-6, 0)$

b) 

$(-\infty, -5)$

c) 

$[-25, \infty)$

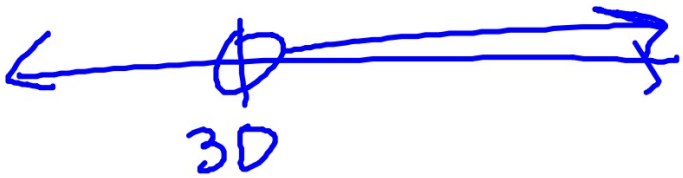
d) 

$(-\infty, 0) \cup [7, \infty)$

e) $2 < x \leq 6$

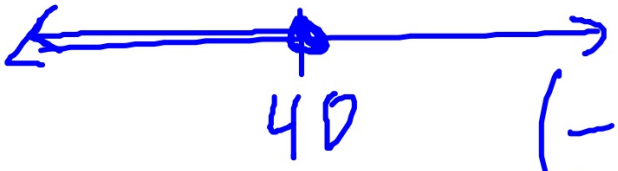
$(2, 6]$

f) $x > 30$



$(30, \infty)$

g) $y \leq 40$



$(-\infty, 40]$

h) the set of real numbers

$(-\infty, \infty)$

i) the set of whole numbers

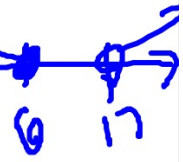
N/A

j) no greater than -25

$x \leq -25$ $(-\infty, -25]$

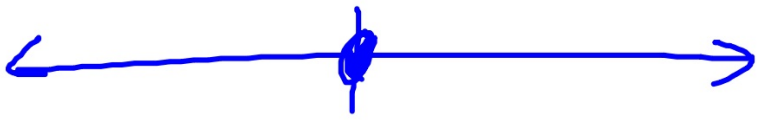
k) $z \leq 6$ or $z > 17$ $(-\infty, 6] \cup (17, \infty)$

l) ~~$x > 0$ or $x < 5$~~ $z \leq 6$ and $z > 17$



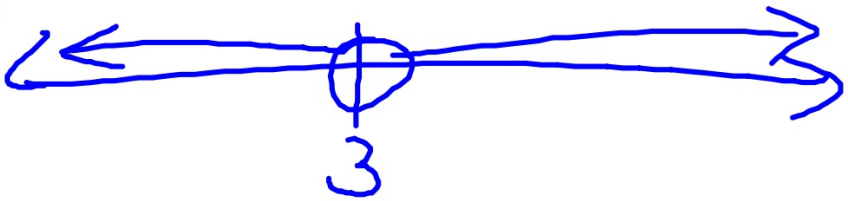
$\emptyset$

m) $n = 3$



$[3, 3]$ or $[3]$

n) $n \neq 3$



$(-\infty, 3) \cup (3, \infty)$

Solve.

① $3(x-4) \leq 2+5(x+1)$

$3x-12 \leq 2+5x+5$

$-2x \leq 19$

$x \geq -\frac{19}{2}$

$\{x \mid x \geq -\frac{19}{2}\}$

$[-\frac{19}{2}, \infty)$

$2(5x+1) > 3(x-3)$

$10x+2 > 3x-9$

$7x > -11$ $\{x \mid x > -11/7\}$

$x > -11/7$

(2) $6\left(\frac{1}{3}(5x+1) > \frac{1}{2}(x-3)\right)$