2. If $-1<g<0$, which of the following gives the correct ordering of $|g|$, g, and g^2?

(A) $g < g^2 < |g|$
(B) $|g| < g^2 < g$
(C) $g^2 < |g| < g$
(D) $g < |g| < g^2$
(E) $|g| < g < g^2$

How do we know to pick numbers?

there are variables

What number should we pick?

$g = -.5$ ← smallest

$|g| = .5$ ← largest $\quad g, g^2, |g|$

$g^2 = .25$

Sets and Intersections

A **set** is a collection of elements (usually numbers) that have a common characteristic.

E is the set of all even integers.

$E = \{2, 4, 6, 8 \ldots\}$
$-2, -4, -6 \ldots$

S is the set of all integers greater than 7.

$S = \{8, 9, 10, 11 \ldots\}$

An **intersection** is where two sets overlap. It is what they have in common.

What is the intersection of the set of people in this room and the set of Fishburne Cadets?

What is the intersection of the set E with the set S?

$E \cap S = \{8, 10, 12, 14, 16 \ldots\}$

3. If X is the set of positive multiples of 2, and Y is the set of positive multiples of 3, then the intersection of X and Y is:

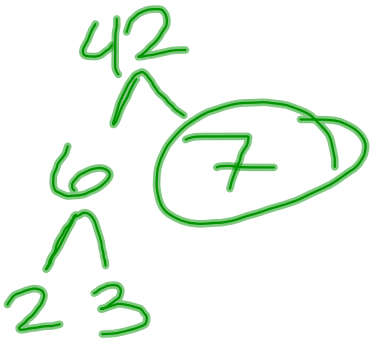
(A) the set of all positive integers
(B) the set of all positive real numbers
(C) the set of all positive multiples of 3
(D) the set of all positive multiples of 2
(E) the set of all positive multiples of 6

When solving set/intersection problems it is helpful to list the members of the sets

$X: \{2, 4, 6, 8, 10, 12, 14, 16, 18 \ldots\}$
$Y: \{3, 6, 9, 12, 15, 18, 21, 24 \ldots\}$
$X \cap Y: 6, 12, 18, 24 \ldots$

1. How many of the prime factors of 42 are greater than 3?

(A) Zero
(B) One
(C) Two
(D) Three
(E) Four



2. If m is a negative number, which of the following must be negative?

(A) 3-m
(B) m^2
(C) 3m+4
(D) m^3+m
(E) -5m

$3+1=4$

$(-1)^2=1$

$3(-1)+4=-3+4=1$

$-5(-1)=5$

$(-1)^3+-1=-1-1=-2$

3. If p is an integer greater than 1 such that p divided by 4 yields a remainder of 0 which of the following could be a prime number?

(A) p/4
(B) $\sqrt{p}$
(C) p/3
(D) p
(E) p+1/2

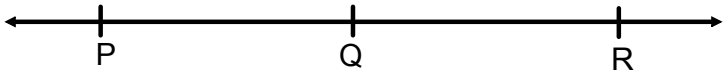
p: 4, 8, 12, 16, 20, 24 . . .

4/4 = 1 12/4 = 3

4. If S is the set of all numbers between -3.5 and 3.5 inclusive, T is the set of all prime numbers, and U is the set of all positive integers, then the intersection of S,T,and U contains how many elements?

(A) 0
(B) 1
(C) 2
(D) 3
(E) More than 3

1, 2, 3 ← prime
not prime
prime



5. If P, Q, and R on the number line above represent consecutive odd integers, which of the following is not true?

(A) P+Q is an even integer
(B) P+Q+R is an odd integer
(C) R-P is an even integer
(D) (P+Q)/2 is an even integer
(E) (P+R)/2 is an even integer

4
9
4
4/2=2

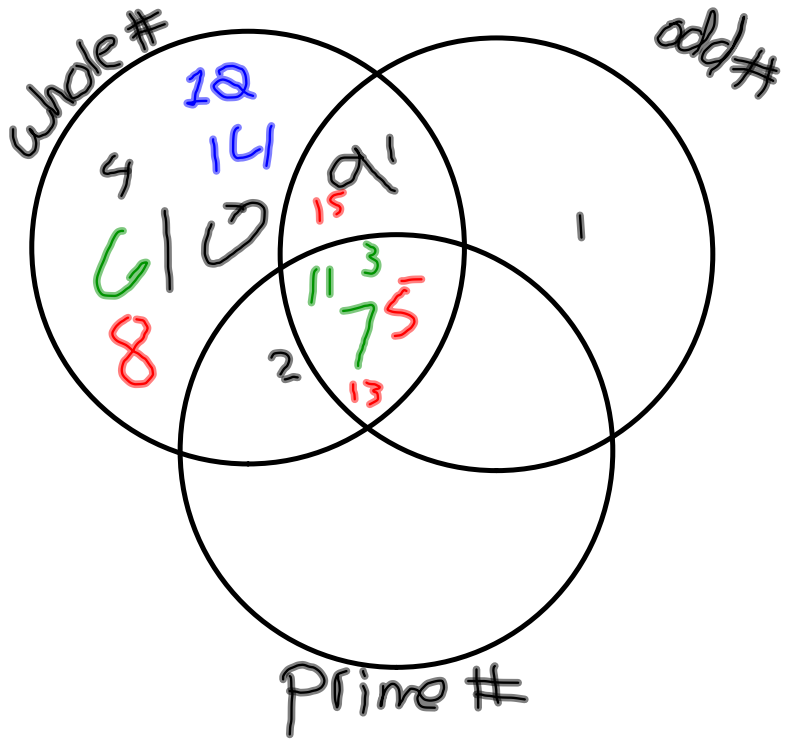
P=1
Q=3
R=5

6/2=3

6. If R contains 10 distinct even integers and set S contains 10 distinct negative integers, what is the maximum possible number of elements in the intersection of the two sets?

(A) 0
(B) 4
(C) 5
(D) 9
(E) 10

-2, -4, -6, -8, -10
-12, -14, -16, -18, -20


whole #
odd #
prime #
10
14
4
9
1
15
6
0
1
11
3
7
5
8
2
13