

Sets and Venn Diagrams

8-28-19

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EQ: How can you use Venn Diagrams to organize and communicate quantitative information?

1. How do I use Venn diagrams in math?

To classify number sets.

set - a collection of numbers or objects

members/elements - number or objects in a set

empty set - $\{\}$ or \emptyset and contains no elements

Special Number Sets

$N = \{0, 1, 2, 3, 4, 5, \dots\}$ all natural or counting numbers

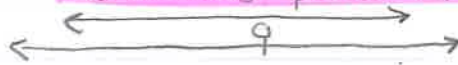
$Z = \{0, \pm 1, \pm 2, \pm 3, \pm 4, \dots\}$ set of all integers

$Z^+ = \{1, 2, 3, 4, 5, 6, \dots\}$ set of all positive integers

$Z^- = \{-1, -2, -3, -4, -5, \dots\}$ set of all negative integers

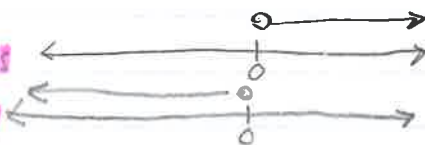
Q : set of all rational numbers $\frac{p}{q}$ p, q are integers $q \neq 0$

R : set of all real numbers placed on a number line



R^+ : set of all positive real numbers

R^- : set of all negative real numbers



2. What is a subset when it is an element of both the universal set and a different set

Elements of Sets

• Number of elements in set A is written $n(A)$

• A set which has a finite number of elements called finite set

• In finite sets - infinitely many elements

3. How do you calculate the number in a set?

Count the elements in that set.

Subsets

• $P \neq Q = 2$ sets P is subset of Q if every element of P is also an element of Q . We write $P \subset Q$

• Proper subset is when $P \neq Q$ - we write $P \subset Q$

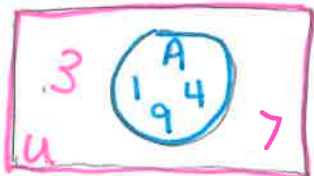
• $P \cap Q$ is the intersection of P & Q w/ elements both P & Q

• $P \cup Q$ is the union of P & Q all elements of P or Q

\cap → and

\cup → union

Venn



$$n(U) = 5$$

$$U = \{1, 3, 4, 7, 9\}$$

$$n(A) = 3$$

$$A = \{1, 4, 9\}$$

(complement)
not A
← opposite
 $A' = \{3, 7\}$

$$n(A) = 5$$

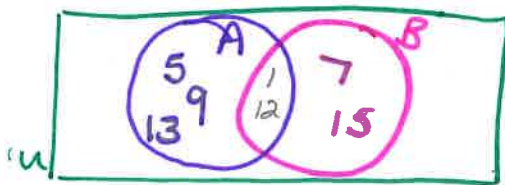
$$n(B) = 4$$

$$n(U) = 7$$

$$A = \{1, 5, 9, 12, 13\}$$

$$B = \{1, 7, 12, 15\}$$

$$U = \{1, 5, 7, 9, 12, 13, 15\}$$



$$n(A \cap B) = 2$$

$$n(A \cup B) = 7$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$n(A \cap B) = n(A) + n(B) - n(A \cup B)$$

$$n(A \cap B') = n(A) - n(A \cap B)$$

$$n(A' \cap B) = n(B) - n(A \cap B)$$

Summary: Venn diagrams help us to organize numbers in different sets and collections. It is a visual way to see sets of numbers and how they interact with each other. We can use the numbers in a set to find the number of elements, if they intersect or are a union of, and to see if there are any subsets. ✓

$$A = \{-5, -4, -3, -2, -1, 0, 1, 2, 3\} \quad n(A) = 9 \quad \leftarrow \text{finite set}$$

$$B = \{-3, -2, -1, 0, \dots\} \quad \therefore n(A) = n/a \quad \leftarrow \text{infinite set}$$

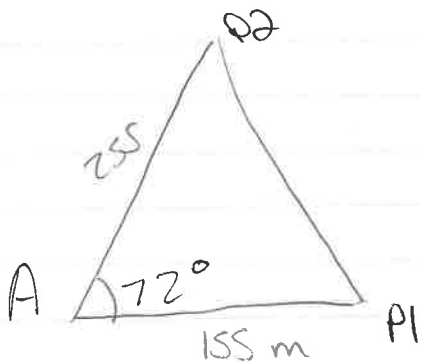
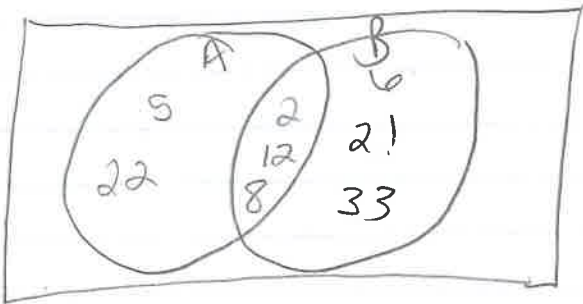
$$\begin{aligned} \text{Line 1} = y - 3x = 2 & \quad 5 - (3)9 = 2 \\ 3x - 2 = y & = -\frac{1}{3}x + 8 = y \end{aligned}$$

$$A = \{2, 5, 8, 12, 22\}$$

$$B = \{2, 6, 8, 12, 21, 33\}$$

$$A \cap B = \{2, 12, 8\} \quad n(A \cap B) = 3$$

$$(A \cap B)' = \{5, 6, 21, 22, 33\}$$



$$c^2 = 255^2 + 155^2 - 2(255)(155)(\cos 72)$$

$$c^2 = 64622.20689$$

$$c = 254.2$$

$$c = 254 \text{ miles}$$