WELCOME

Set Theory

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Outline

1. Set Theory
   - Introduction to Sets
   - Sets
2. Origin of Set Theory
3. Definitions
4. Problems

Set Theory

This is where mathematics starts.

Introduction to Sets

What is set ?

Well, simply put, it's **a collection**.

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Definition

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What is set ?

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Definition

A set is a collection of well defined objects or things.

First we specify a common property among "things" and then we gather up all the "things" that have this common property.

Introduction to Sets

For Example

The items you wear: shoes, socks, hat, shirt, pants, and so on.

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Introduction to Sets

For Example

Types of fingers.

Introduction to Sets

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Types of fingers. This set includes index, middle, ring, and pinky.

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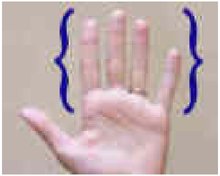

Introduction to Sets

For Example

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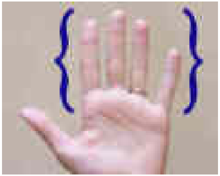

So it is just things grouped together with a certain property in common.

Introduction to Sets

Notation

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The curly brackets $\{ \quad \}$ are sometimes called "set brackets" or "braces".

Notation for Examples

{ socks, shoes, watches, shirts, . . . } - For Example 1

Introduction to Sets

Notation for Examples

{ socks, shoes, watches, shirts, ... } - For Example 1
{ index, middle, ring, pinky } - For Example 2

Introduction to Sets

Notation for Examples

$\{$ socks, shoes, watches, shirts, $\ldots\}$ - For Example 1
$\{$ index, middle, ring, pinky $\}$ - For Example 2

Notice how the first example has the “$\cdots$ “.

Introduction to Sets

Notation for Examples

{ socks, shoes, watches, shirts, . . . } - For Example 1
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Notice how the first example has the "$\cdots$". The three dots $\cdots$ are called an ellipsis, and mean "continue on".

Introduction to Sets

Notation for Examples

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Notice how the first example has the "$\cdots$". The three dots $\cdots$ are called an ellipsis, and mean "continue on".

The first set $\{$ socks, shoes, watches, shirts, $\ldots\}$ we call an infinite set,

Introduction to Sets

Notation for Examples

{ socks, shoes, watches, shirts, ... } - For Example 1
{ index, middle, ring, pinky } - For Example 2

Notice how the first example has the "$\cdots$ ". The three dots $\cdots$ are called an ellipsis, and mean "continue on".

The first set { socks, shoes, watches, shirts, ...} we call an infinite set,
the second set { index, middle, ring, pinky } we call a finite set.

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Numerical Sets

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- Set of even numbers: $\{\ldots, -4, -2, 0, 2, 4, \ldots\}$
- Set of odd numbers: $\{\ldots, -3, -1, 1, 3, \ldots\}$
- Set of prime numbers: $\{2, 3, 5, 7, 11, 13, 17, \ldots\}$

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- Set of odd numbers: $\{\ldots, -3, -1, 1, 3, \ldots\}$
- Set of prime numbers: $\{2, 3, 5, 7, 11, 13, 17, \ldots\}$
- Positive multiples of 3 that are less than 10: $\{3, 6, 9\}$

Universal Set

At the start we used the word "things" in quotes.

Introduction to Sets

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Universal Set

At the start we used the word "things" in quotes. We call this the universal set. It's a set that contains everything. Well, not exactly everything. Everything that is relevant to our question.

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For Example

$$A = \{a, e, i, o, u\}$$

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When talking about sets, it is fairly standard to use Capital Letters $A, B, C, \ldots$ to represent the set, and lower-case letters $a, b, c, \ldots$ to represent an element in that set.

For Example

$$A = \{a, e, i, o, u\}$$

Here A denotes the set of vowels, and a, e, i, o, u is an element of the set A.

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When we say an element a is in a set A,

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Set A is $\{1, 2, 3\}$.

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For Example

Set A is $\{1, 2, 3\}$. We can see that $1 \in A$,

Introduction to Sets

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When we say an element a is in a set A, we use the symbol $\in$ to show it. And if something is not in a set use $\notin$.

For Example

Set A is $\{1, 2, 3\}$. We can see that $1 \in A$, but $5 \notin A$.

Introduction to Sets

Equality

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Equality

Two sets are equal if they have precisely the same members. Now, at first glance they may not seen equal, so we may have to examine them closely!

Introduction to Sets

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Are A and B equal where:

Introduction to Sets

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Are A and B equal where:

☞ A is the set whose members are the first four positive whole numbers

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Let's check.

Introduction to Sets

For Example

Are A and B equal where:

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Let's check. They both contain 1.

For Example

Are A and B equal where:

- ☞ A is the set whose members are the first four positive whole numbers
- ☞ $B = \{4, 2, 1, 3\}$

Let's check. They both contain 1. They both contain 2.

Introduction to Sets

For Example

Are A and B equal where:

- ☞ A is the set whose members are the first four positive whole numbers
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Let's check. They both contain 1. They both contain 2. And 3, And 4.

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Are A and B equal where:

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Let's check. They both contain 1. They both contain 2. And 3, And 4. And we have checked every element of both sets,

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Let's check. They both contain 1. They both contain 2. And 3, And 4. And we have checked every element of both sets, so: Yes, they are equal !

Introduction to Sets

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Are A and B equal where:

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Let's check. They both contain 1. They both contain 2. And 3, And 4. And we have checked every element of both sets, so: Yes, they are equal !

$$A = B$$

Introduction to Sets

Subsets

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We have the set $\{1, 2, 3, 4, 5\}$. A subset of this is $\{1, 2, 3\}$. Another subset is $\{3, 4\}$

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We have the set $\{1, 2, 3, 4, 5\}$. A subset of this is $\{1, 2, 3\}$. Another subset is $\{3, 4\}$ or even another, $\{1\}$.

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We have the set $\{1, 2, 3, 4, 5\}$. A subset of this is $\{1, 2, 3\}$. Another subset is $\{3, 4\}$ or even another, $\{1\}$. However, $\{1, 6\}$ is not a subset,

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Introduction to Sets

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We have the set $\{1, 2, 3, 4, 5\}$. A subset of this is $\{1, 2, 3\}$. Another subset is $\{3, 4\}$ or even another, $\{1\}$. However, $\{1, 6\}$ is not a subset, since it contains an element 6 which is not in the parent set.

In general

A is a subset of B if and only if every element of A is in B.

For Example

Let A be all multiples of 4 and B be all multiples of 2. Is A a subset of B? And is B a subset of A?

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Introduction to Sets

For Example

Let A be all multiples of 4 and B be all multiples of 2. Is A a subset of B? And is B a subset of A?
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The sets are

$A = \{\ldots, -8, -4, 0, 4, 8, \ldots\}$

Introduction to Sets

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Introduction to Sets

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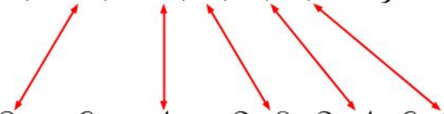

$$B = \{\ldots, -8, -6, -4, -2, 0, 2, 4, 6, 8, \ldots\}$$

Introduction to Sets

$$A = \{\ldots, -8, -4, 0, 4, 8, \ldots\}$$

$$B = \{\ldots, -8, -6, -4, -2, 0, 2, 4, 6, 8, \ldots\}$$

By pairing off members of the two sets, we can see that every member of A is also a member of B,

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Introduction to Sets

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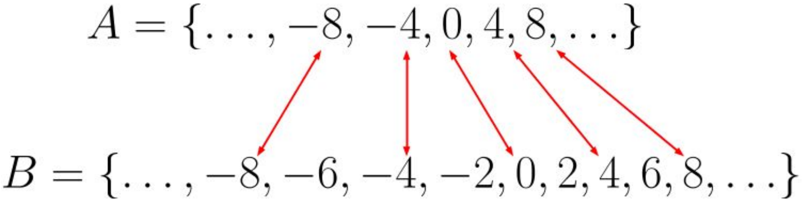
By pairing off members of the two sets, we can see that every member of A is also a member of B, but every member of B is not a member of A.

A is a subset of B,

Introduction to Sets



By pairing off members of the two sets, we can see that every member of A is also a member of B, but every member of B is not a member of A.

A is a subset of B, but B is not a subset of A

Proper Subsets

Let A be a set. Is every element in A an element in A? (Yes, I wrote that correctly.)

Proper Subsets

Let A be a set. Is every element in A an element in A? (Yes, I wrote that correctly.) So doesn't that mean that A is a subset of A?

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Let A be a set. Is every element in A an element in A? (Yes, I wrote that correctly.) So doesn't that mean that A is a subset of A? This doesn't seem very proper, does it?

Introduction to Sets

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Definition

A is a proper subset of B if and only if

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Proper Subsets

Let A be a set. Is every element in A an element in A? (Yes, I wrote that correctly.) So doesn't that mean that A is a subset of A? This doesn't seem very proper, does it? We want our subsets to be proper. So we introduce proper subsets.

Definition

A is a proper subset of B if and only if every element in A is also in B, and there exists at least one element in B that is not in A.

Introduction to Sets

For Example

$\{1, 2, 3\}$ is a subset of $\{1, 2, 3\}$,

Introduction to Sets

For Example

$\{1, 2, 3\}$ is a subset of $\{1, 2, 3\}$, but is not a proper subset of $\{1, 2, 3\}$.

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$\{1, 2, 3\}$ is a proper subset of $\{1, 2, 3, 4\}$

Introduction to Sets

For Example

$\{1, 2, 3\}$ is a subset of $\{1, 2, 3\}$, but is not a proper subset of $\{1, 2, 3\}$.
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Introduction to Sets

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Notice that if A is a proper subset of B,

Introduction to Sets

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Introduction to Sets

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Notice that if A is a proper subset of B, then it is also a subset of B.

Even More Notation

When we say that A is a subset of B, we write $A \subseteq B$.

Introduction to Sets

For Example

$\{1, 2, 3\}$ is a subset of $\{1, 2, 3\}$, but is not a proper subset of $\{1, 2, 3\}$.
$\{1, 2, 3\}$ is a proper subset of $\{1, 2, 3, 4\}$ because the element 4 is not in the first set.

Notice that if A is a proper subset of B, then it is also a subset of B.

Even More Notation

When we say that A is a subset of B, we write $A \subseteq B$.
Or we can say that A is not a subset of B by $A \nsubseteq B$ ("A is not a subset of B")

Introduction to Sets

Empty or Null Set

As an example, think of the set of piano keys on a guitar.

Empty or Null Set

As an example, think of the set of piano keys on a guitar. “But wait!” you say, “There are no piano keys on a guitar!”

Introduction to Sets

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As an example, think of the set of piano keys on a guitar. "But wait!" you say, "There are no piano keys on a guitar!" And right you are.

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Definition

A set which contains no element is known as the Empty Set (or Null Set).

Empty or Null Set

As an example, think of the set of piano keys on a guitar. "But wait!" you say, "There are no piano keys on a guitar!" And right you are. It is a set with no elements.

Definition

A set which contains no element is known as the Empty Set (or Null Set).

Notation

It is represented by $\emptyset$ Or by $\{\ \}$ (a set with no elements)

Set

Set - Definition

A set is a collection of well defined objects.

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For Example

You could have a set made up of your ten best friends

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Set - Definition

A set is a collection of well defined objects.

For Example

You could have a set made up of your ten best friends

$$\text{Friends} = \{ \text{Anbu, Babu, John, Joel, Dass, David, Ravi, Raj, Selva, Vimal} \}$$

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You could have a set made up of your ten best friends

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Anbu, Babu, Ravi and Raj play Soccer.

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Anbu, Babu, Ravi and Raj play Soccer.

Selva, Ravi and Raj play Tennis.

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For Example

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Friends = { Anbu, Babu, John, Joel, Dass, David, Ravi, Raj, Selva, Vimal }

Anbu, Babu, Ravi and Raj play Soccer.

Selva, Ravi and Raj play Tennis.

Set

Union

You can now list your friends that play Soccer OR Tennis.

Set

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You can now list your friends that play Soccer OR Tennis. This is called a "Union" of sets and has the special symbol $\bigcup$.

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$$\text{Soccer} \cup \text{Tennis} = \{ \text{Anbu, Babu, Ravi, Raj, Selva} \}$$

Union

You can now list your friends that play Soccer OR Tennis. This is called a "Union" of sets and has the special symbol $\bigcup$.

$$\text{Soccer} \ \cup \text{Tennis} = \{ \text{Anbu, Babu, Ravi, Raj, Selva} \}$$

Not everyone is in that set.

Union

You can now list your friends that play Soccer OR Tennis. This is called a "Union" of sets and has the special symbol $\bigcup$.

Soccer $\cup$ Tennis = { Anbu, Babu, Ravi, Raj, Selva }

Not everyone is in that set. Only your friends that play Soccer or Tennis (or both).

Set

Intersection

"Intersection" is when you have to be in BOTH sets.

Intersection

"Intersection" is when you have to be in BOTH sets. In our case that means they play both Soccer AND Tennis.

Set

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"Intersection" is when you have to be in BOTH sets. In our case that means they play both Soccer AND Tennis. Which is Ravi and Raj.

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$$\text{Soccer} \cap \text{Tennis} = \{\text{ Ravi, Raj }\}$$

Set

Difference

You can also subtract one set from another.

Set

Difference

You can also subtract one set from another. For example, taking Soccer and subtracting Tennis means people that play Soccer but NOT Tennis.

Set

Difference

You can also subtract one set from another. For example, taking Soccer and subtracting Tennis means people that play Soccer but NOT Tennis. Which is Anbu and Babu.

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Difference

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$$\text{Soccer - Tennis} = \{ \text{ Anbu, Babu } \}$$

Summary So Far

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- $\bigcup$ is Union: is in either set
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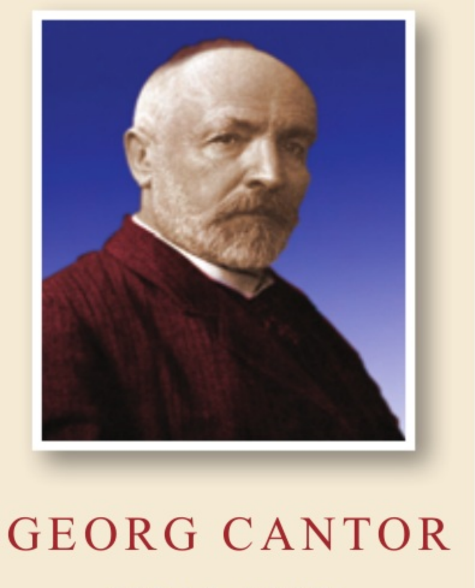
Origin of Set Theory

Origin of Set Theory



Origin of Set Theory

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- Cantor's work was fundamental to the later investigation of Mathematical logic.

Definitions

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A set is a collection of well-defined objects. The objects of a set are called elements or members of the set.

The main property of a set in mathematics is that it is well-defined. This means that given any object, it must be clear whether that object is a member (element) of the set or not. The objects of a set are all distinct, i.e., no two objects are the same.

Definitions

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Example

Consider the set $A = \{-1, 0, 1, 2, 3, 4, 5\}$. The set A has 7 elements. $\therefore$ The cardinal number of A is 7. i.e., $n(A) = 7$.

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Empty Set

A set containing no elements is called the empty set or null set or void set.

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Example

Consider the set $A = \{x : x < 1, x \in \mathbb{N}\}$. There are no natural numbers which are less than 1.

Definitions

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Consider the sets $A = \{a, b, c, d\}$ and $B = \{d, b, a, c\}$.
Set A and B contain exactly the same elements.
$\therefore\ A = B$.

Definitions

Subset

A set A is a subset of set B if every element of A is also an element of B.

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$\therefore$ A is a subset of B. i.e., $A \subseteq B$.

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Consider the sets $A = \{5, 7, 8\}$ and $B = \{5, 6, 7, 8\}$.
Every element of A is also an element of B and $A \neq B$.
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Example

If the elements currently under discussion are integers, then the universal set U is the set of all integers. i.e., $U = \{x : x \in \mathbb{Z}\}$.

Definitions

Complement Set

The set of all elements of U (universal set) that are not elements of $A \subseteq U$ is called the complement of A.

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Definitions

Union of Sets

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Difference of two Sets

The difference of the two sets A and B is the set of all elements belonging to A but not to B. The difference of the two sets is denoted by $A - B$

- ☆ In symbol, $A - B = \{x : x \in A \text{ and } x \notin B\}$
- ☆ Similarly, $B - A = \{x : x \in B \text{ and } x \notin A\}$

Example

Consider the set $A = \{2, 3, 5, 7, 11\}$ and $B = \{5, 7, 9, 11, 13\}$. To find $A - B$, we remove the elements of B from A. $\therefore$ $A - B = \{2, 3\}$.

Definitions

Symmetric Difference

The symmetric difference of two sets A and B is the union of their differences

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Example

Consider the sets $A = \{a, b, c, d\}$ and $B = \{b, d, e, f\}$.

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The symmetric difference of two sets A and B is the union of their differences and is denoted by $A \Delta B$.

$$\text{Thus, } A \Delta B = (A - B) \cup (B - A)$$

Example

Consider the sets $A = \{a, b, c, d\}$ and $B = \{b, d, e, f\}$.
We have, $A - B = \{a, c\}$

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The symmetric difference of two sets A and B is the union of their differences and is denoted by $A \Delta B$.

$$\text{Thus, } A \Delta B = (A - B) \cup (B - A)$$

Example

Consider the sets $A = \{a, b, c, d\}$ and $B = \{b, d, e, f\}$. We have, $A - B = \{a, c\}$ and $B - A = \{e, f\}$.

Definitions

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The symmetric difference of two sets A and B is the union of their differences and is denoted by $A \Delta B$.

$$\text{Thus, } A \Delta B = (A - B) \cup (B - A)$$

Example

Consider the sets $A = \{a, b, c, d\}$ and $B = \{b, d, e, f\}$.
We have, $A - B = \{a, c\}$ and $B - A = \{e, f\}$.
$\therefore\ A \Delta B = \{(A - B) \cup (B - A) = \{a, c, e, f\}$.

Definitions

For any two finite sets A and B, we have

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

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

Problems

Problems

Question 1

In a class of 120 students numbered 1 to 120,

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Answer Key

(a) 19
(b) 41
(c) 21
(d) 57

Problems

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In a class of 120 students numbered 1 to 120, all even numbered students opt for Physics, whose numbers are divisible by 5 opt for Chemistry and those whose numbers are divisible by 7 opt for Math. How many opt for none of the three subjects ?

Answer Key

(a) 19

(b) 41

(c) 21

(d) 57

Answer is

The correct choice is (b) 41

Problems

Explanation

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

Problems

Explanation

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

$n(A) = 60, n(B) = 24, n(C) = 17$

Problems

Explanation

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Problems

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

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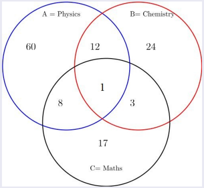
Diagram



Problems

Explanation

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

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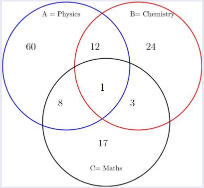

Answer is

$n(A \cup B \cup C) = 60 + 24 + 17 - (12 + 8 + 3) + 1 = 79$

Problems

Explanation

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

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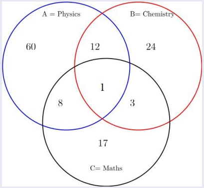
Diagram



Answer is

$n(A \cup B \cup C) = 60 + 24 + 17 - (12 + 8 + 3) + 1 = 79$

So, $120 - 79 = 41.$

Problems

Question 2

Of the 200 candidates who were interviewed for a position at a call center,

Problems

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Question 2

Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone.

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Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both a two-wheeler and a credit card,

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Question 2

Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone

Problems

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Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both a two wheeler and mobile phone

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Answer Key

(a) 0
(b) 20
(c) 10
(d) 18
(e) 25

Problems

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Answer Key

(a) 0

(b) 20

(c) 10

(d) 18

(e) 25

Answer is

The correct choice is (c) 10

Problems

Explanation

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

Problems

Explanation

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

$n(A) = 100, n(B) = 70, n(C) = 140$

Problems

Explanation

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

$n(A) = 100, n(B) = 70, n(C) = 140$

$n(A \cap B) = 40, n(B \cap C) = 30, n(C \cap A) = 60,$

Problems

Explanation

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

$n(A) = 100, n(B) = 70, n(C) = 140$

$n(A \cap B) = 40, n(B \cap C) = 30, n(C \cap A) = 60,$

$n(A \cap B \cap C) = 10$

Problems

Explanation

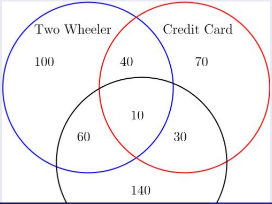
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - (n(A \cap B) + n(B \cap C) + n(C \cap A)) + n(A \cap B \cap C)$

$n(A) = 100, n(B) = 70, n(C) = 140$

$n(A \cap B) = 40, n(B \cap C) = 30, n(C \cap A) = 60,$

$n(A \cap B \cap C) = 10$

Diagram



Problems

Explanation

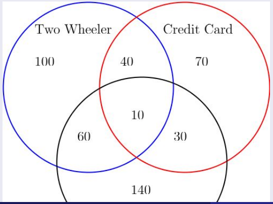
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - (n(A \cap B) + n(B \cap C) + n(C \cap A)) + n(A \cap B \cap C)$

$n(A) = 100, n(B) = 70, n(C) = 140$

$n(A \cap B) = 40, n(B \cap C) = 30, n(C \cap A) = 60,$

$n(A \cap B \cap C) = 10$

Diagram



Answer is

$n(A \cup B \cup C) = 100 + 70 + 140 - (40 + 30 + 60) + 10 = 190$

Problems

Explanation

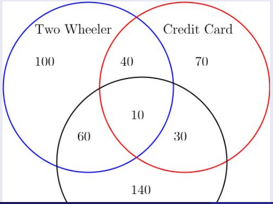
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - (n(A \cap B) + n(B \cap C) + n(C \cap A)) + n(A \cap B \cap C)$

$n(A) = 100, n(B) = 70, n(C) = 140$

$n(A \cap B) = 40, n(B \cap C) = 30, n(C \cap A) = 60,$

$n(A \cap B \cap C) = 10$

Diagram



Answer is

$n(A \cup B \cup C) = 100 + 70 + 140 - (40 + 30 + 60) + 10 = 190$

So, $200 - 190 = 10.$

Problems

Question 3

In a class of 40 students, 12 enrolled for both English and German.

Problems

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In a class of 40 students, 12 enrolled for both English and German. 22 enrolled for German.

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In a class of 40 students, 12 enrolled for both English and German. 22 enrolled for German. If the students of the class enrolled for at least one of the two subjects, then how many students enrolled for only English and not German ?

Problems

Question 3

In a class of 40 students, 12 enrolled for both English and German. 22 enrolled for German. If the students of the class enrolled for at least one of the two subjects, then how many students enrolled for only English and not German ?

Answer Key

(a) 30
(b) 10
(c) 18
(d) 28
(e) 32

Problems

Question 3

In a class of 40 students, 12 enrolled for both English and German. 22 enrolled for German. If the students of the class enrolled for at least one of the two subjects, then how many students enrolled for only English and not German ?

Answer Key

(a) 30

(b) 10

(c) 18

(d) 28

(e) 32

Answer is

The correct choice is (c) 18

Problems

Explanation

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

Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) =??, n(B) = 22$

Problems

Explanation

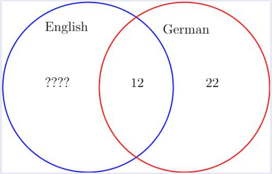
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = ??, n(B) = 22$
$n(A \cap B) = 12$

Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = ??, n(B) = 22$
$n(A \cap B) = 12$

Diagram

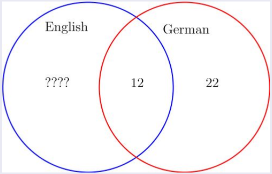


Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = ??, n(B) = 22$
$n(A \cap B) = 12$

Diagram



Answer is

$40 = A + 22 - 12 \Rightarrow$
$A = 30$

Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = ??, n(B) = 22$
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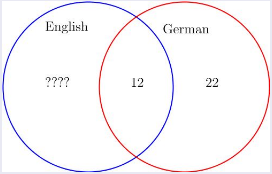
Diagram



Answer is

$40 = A + 22 - 12 \Rightarrow$
$A = 30$
So, English only is 30-12 $=$ 18

Problems

Question 4

In a class 40% of the students enrolled for Math

Problems

Question 4

In a class 40% of the students enrolled for Math and 70% enrolled for Economics.

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In a class 40% of the students enrolled for Math and 70% enrolled for Economics. If 15% of the students enrolled for both Math and Economics,

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In a class 40% of the students enrolled for Math and 70% enrolled for Economics. If 15% of the students enrolled for both Math and Economics, what % of the students of the class did not enroll for either of the two subjects ?

Problems

Question 4

In a class 40% of the students enrolled for Math and 70% enrolled for Economics. If 15% of the students enrolled for both Math and Economics, what % of the students of the class did not enroll for either of the two subjects ?

Answer Key

(a) 5%

(b) 15%

(c) 0%

(d) 25%

(e) None of these

Problems

Question 4

In a class 40% of the students enrolled for Math and 70% enrolled for Economics. If 15% of the students enrolled for both Math and Economics, what % of the students of the class did not enroll for either of the two subjects ?

Answer Key

(a) 5%
(b) 15%
(c) 0%
(d) 25%
(e) None of these

Answer is

The correct choice is
(a) 5%

Problems

Explanation

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

Problems

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$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = 40, n(B) = 70$

Problems

Explanation

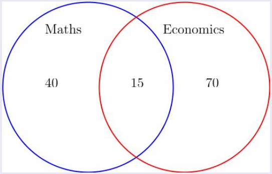
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = 40, n(B) = 70$
$n(A \cap B) = 15$

Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = 40, n(B) = 70$
$n(A \cap B) = 15$

Diagram



Problems

Explanation

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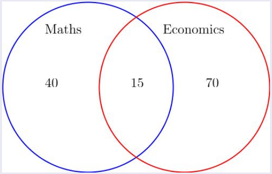


Answer is

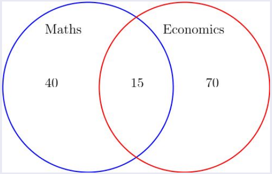
$A \cup B = 40 + 70 - 15 \Rightarrow$
$A \cup B = 95$ i.e., 95% students enrolled for both.

Problems

Explanation

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$n(A) = 40, n(B) = 70$
$n(A \cap B) = 15$

Diagram



Answer is

$A \cup B = 40 + 70 - 15 \Rightarrow$
$A \cup B = 95$ i.e., 95%
students enrolled for both.
So, 5% students not enrolled for both.

❦ ❦ ❦ Interaction ❦ ❦ ❦


Thank you ...