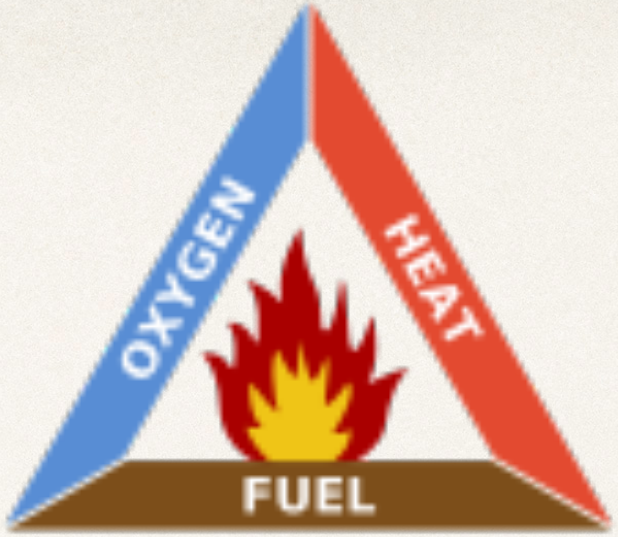
Necessary conditions versus Sufficient conditions



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(1) What Is the Difference?

The baby grows ***only if*** it eats

Eating food is a ***necessary condition*** for the baby to grow

But eating food need **is not sufficient** for the baby to grow. The baby needs other things (e.g. healthy environment, protection) in order to grow.

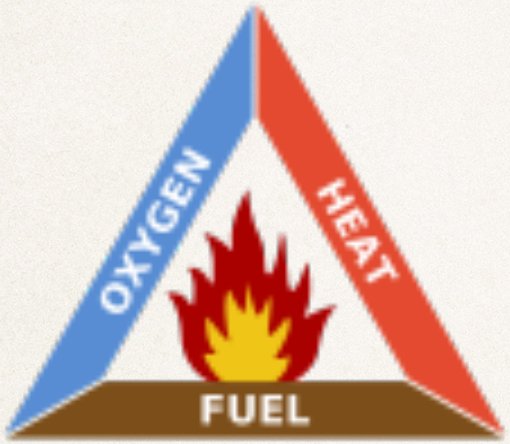
(2) What Is the Difference?

The sidewalk gets wet *if* it rains.

Raining is a ***sufficient condition*** for the sidewalk to get wet.

But the rain **is not necessary** for the sidewalk to get wet. The sidewalk can get wet in other ways, for example, by pouring water on it.

(1) What Is Necessary for What?



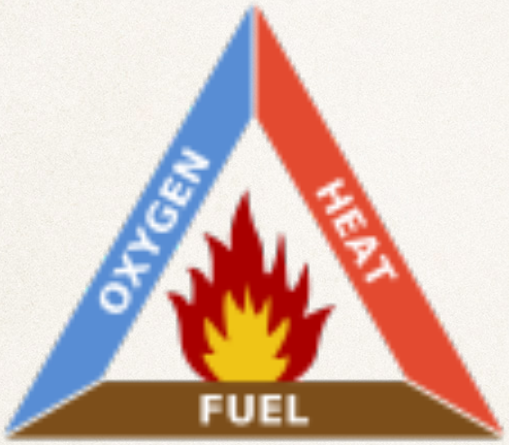
Oxygen is a *necessary condition for* fire.

Fuel is a *necessary condition for* fire.

If a fire burns, *then* there is oxygen.
Fire burns *only if* there is oxygen.
If there is *no* oxygen, *then* fire does *not* burn.

If a fire burns, *then* there is fuel (burning).
Fire burns *only if* there is fuel (burning).
If there is *no* fuel (burning), *then* fire does not burn.

(2) What Is Sufficient for What?



Oxygen is a necessary condition, but not sufficient for fire.

Fuel is a necessary condition, but not sufficient for fire.

Are oxygen and fuel, together, sufficient for fire?

Is fire sufficient for heat?
Is it necessary?

Enforcing the Law

In its crackdown against drunk drivers, Massachusetts law enforcement officials are revoking liquor licenses left and right. You are a bouncer in a Boston bar, and you'll loose your job unless you enforce the following law:

"If a person is drinking beer, then he must be over 20 years old."

The cards below have information about four people sitting at a table in your bar. Each card represents one person. One side of a card tells what a person is drinking and the other side of the card tells that person's age. Indicate only those card(s) you definitely need to turn over to see if any of these people are breaking the law.

drinking beer	**drinking coke**	**25 years old**	**16 years old**

The Wason Selection Task

WASON CARD SELECTION TASK

Each of these cards has a letter on one side and a number on the other. Which two cards should you turn over to allow you to decide if the following statement is true:

"If there is a D on one side, there is a 5 on the other"?

A Video About the Distinction

Necessary condition

Sufficient condition

You Tube Video on the distinction
https://www.youtube.com/watch?v=5LqNm9d2__I

Necessary v. Sufficient Conditions Within Arguments

(1) Does the Conclusion Follow (Deductively) from the Premises?

Premise: If money supply increases, prices will go up.

Premise: The money supply in the US is increasing.

Conclusion: Prices in the US will go up.

YES! According to the premises, an increase in the money supply is **sufficient for** an increase in prices.

(2) Does the Conclusion Follow (Deductively) from the Premises?

Premise: If money supply increases, prices will go up.

Premise: The money supply in the US is not increasing.

Conclusion: Prices in the US will not go up.

NO! According to the premises, an increase in money supply is sufficient for an increase in prices, but it **need not be a necessary condition.**

From the LSAT Test

Everyone who is compassionate is kind, and someone who has experienced life's challenges is invariably compassionate. Jeremy is kind, so he has experienced life's challenges.

What's wrong with this reasoning?

(a) If x is compassionate, then x is kind.

(b) If x has experienced challenges, then x is compassionate.

Hence, if Jeremy is kind, then Jeremy has experienced challenges.

Given premises (a) and (b), *being kind* is a necessary condition for *having experienced challenges*, not a sufficient condition.

Two Equivalent Formulations

If A, then B.

A is a *sufficient condition for* B.

B is a *necessary condition for* A.

A only if B.

A is a *sufficient condition for* B.

B is a *necessary condition for* A.