

Is time an interval or ratio variable? (Explanation & Example)

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Time is a quantitative variable that measures the duration of an event or the interval between two events. It can be classified as either an interval or ratio variable, depending on the context in which it is being measured.

In the context of a clock or calendar, time is considered an interval variable because the intervals between each unit of time (e.g. minutes, hours, days) are consistent and meaningful. For example, the interval between 2 PM and 3 PM is the same as the interval between 10 AM and 11 AM.

On the other hand, in the context of a stopwatch or timer, time can be considered a ratio variable because it has a true zero point. This means that a value of 0 represents the absence of time. For instance, if a race starts at 0 seconds, it means there is no elapsed time.

In conclusion, whether time is classified as an interval or ratio variable depends on the context in which it is being measured.

Is Time An Interval or Ratio Variable? (Explanation & Example)

In statistics, all variables are measured on one of four :

Nominal: Variables that have no quantitative values.
Ordinal: Variables that have a natural order, but no quantifiable difference between values.
Interval: Variables that have a natural order and a quantifiable difference between values, but no "true zero" value.
Ratio: Variables that have a natural order, a quantifiable difference between values, and a "true zero" value.

The following graphic summarizes these different levels of measurement:

Levels of Measurement

Nominal	Ordinal	Interval	Ratio
"Eye color"	"Level of satisfaction"	"Temperature"	"Height"
Named	Named	Named	Named
	Natural order	Natural order	Natural order
		Equal interval between variables	Equal interval between variables
			Has a "true zero" value, thus ratio between values can be calculated

One question students often have is:

Is "time" considered an interval or ratio variable?

The short answer:

Time is considered an interval variable because differences between all time points are equal but there is no "true zero" value for time.

For example, the difference between 1 PM and 2 PM is the same as the difference between 2 PM and 3 PM, which is the same as the difference between 3 PM and 4 PM, and so on.

However, there is not "true zero" value of time. For example, we can't say that 2 PM is twice as old of a time as 1 PM.

Contrast this with a ratio variable like weight: We can say that 100 pounds is twice as much as 50 pounds. The same cannot be said for time.

When is Time Not an Interval Variable?

The only scenario where time would not be considered an interval variable is if we're talking about a duration of time.

Consider the following scenarios:

Scenario 1: Marathon Times

Suppose we keep track of how long it takes people to run a marathon. In this scenario, the duration of time would be considered a ratio variable because there is a "true zero" value - zero seconds.

We could also say that someone who runs the marathon in 2 hours ran it in half the amount of time as someone who ran it in 4 hours.

Suppose we compare two recipes for cooking a certain meal. One recipe has a total cooking time of 40 minutes and the other has a cooking time of 20 minutes.

In this scenario, the duration of cooking time would be considered a ratio variable because there is a true zero value - zero minutes.

We could also say that one recipe has a cooking time that is twice as long as the other.

These represent scenarios where we would classify time as a ratio variable instead of an interval variable.

The following tutorials offer additional information on types of variables: