Arithmetic Comparisons of Amounts and Ratios involving Two Groups
Comparisons help set the context.

Arithmetic comparisons of two counts or amounts: These are ordered relationships that compare a test amount with a base amount.
The base amount is designated by "as" or "than" in a comparison, or by "Compare Test with or to Base" in a command or question.

Let X equal the size of an arithmetic comparison.
Note that X depends on the size of the test and base and on the type of comparison. When comparing two counts or amounts X is given by:

- Simple Difference: X = Test – Base. Note: A difference in percentage amounts is measured in percentage points.
- Times Ratio: X = Test / Base
- Percentage Difference: X = 100% * (Test – Base) / Base
- Times Difference: X = (Test – Base) / Base

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Part-whole ratios: These can always be illustrated using a pie where the pie is the whole and the slice is the part.

Common-part comparisons of two simple part-whole ratios: These always involve comparing a test ratio with a base ratio.* **See pages 2-3.**
The base whole is designated by "as" or "than" in a comparison, or by "Compare Test with (to) Base" in a command or question.

- Test Ratio = Part / Whole1 where Whole1 may be determined by common conditions such as place or time.
- Base Ratio = Part / Whole2 where Whole2 may be determined by common conditions such as place or time.

Comparisons of a single part-whole ratio in two different places or at two different times.* **See pages 4-5.**
The base condition is designated by "as" or "than" in a comparison, or by "Compare Test with (to) Base" in a command or question.

- Test Ratio = (Part / Whole) given (in or at) Test where the Test condition determines the size of the ratio.
- Base Ratio = (Part / Whole) given (in or at) Base where Base condition determines the size of the ratio.

The size of an arithmetic comparison, X, of two ratios is as follows:

- Simple Difference: X = Test Ratio – Base Ratio. Note: A difference in percentages is measured in percentage points.
- Simple Ratio: X = Test Ratio / Base Ratio
- Percentage Difference: X = 100% * (Test Ratio – Base Ratio) / Base Ratio
- Times Difference: X = (Test Ratio– Base Ratio) / Base Ratio

* These ratios (this ratio) must be part-whole for percentage and prevalence grammars; are typically part-whole for likely and chance grammars. In some cases, the ratio is not part-whole (km per hour), so substitute numerator and denominator for part and whole.

Arithmetic Comparisons of Two Common-Part Ratios:
Test and Base are Wholes; Percentage and Likely Grammar

Overview: These pages show comparisons of ratios involving four named ratio grammars (percentage, likely, rate and chance) and four kinds of arithmetic comparisons (simple difference, times ratio, percentage difference and times difference). The first two pages show comparisons of ratios involving Percentage and Likely grammar. The last two pages show comparisons involving Rate and Chance grammar.

Note: This example of a Part and Whole that would fit all these forms: The death rate among men versus women.

Percentage Grammar Comparisons (Includes Proportion and Fraction)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The percentage of *Whole1* who are *Part* is X percentage points more than the percentage of *Whole2* who are *Part*	The percentage of *Whole1* who are Part is X times as much as the percentage of *Whole2* who are *Part*	The percentage of *Whole1* who are *Part* is X% more than the percentage of *Whole2* who are *Part*	The percentage of Whole1 who are *Part* is X times more than the percentage of *Whole2* who are *Part*
The percentage who are *Part* is X percentage points more among *Whole1* than among *Whole2*	The percentage who are *Part* is X times as much among *Whole1* as among *Whole2*	The percentage who are *Part* is X% more among *Whole1* than among *Whole2*	The percentage who are *Part* is X times more among *Whole1* than among *Whole2*
The percentage of *Part* is X percentage points more among *Whole1* than among *Whole2*	The percentage of *Part* is X times as much among *Whole1* as among *Whole2*	The percentage of *Part* is X% more among *Whole1* than among *Whole2*	The percentage of *Part* is X times more among *Whole1* than among *Whole2*

Likely Grammar Comparisons			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
Part is X percentage points more likely* [prevalent] among *Whole1* than among *Whole2*	*Part* is X times as likely* [prevalent] among *Whole1* as [it is] among *Whole2*	*Part* is X% more likely* [prevalent] among *Whole1* than among *Whole2*	*Part* is X times more likely* [prevalent] among *Whole1* than among *Whole2*
Whole1 is X percentage points more likely to *Part* than is *Whole2*.	*Whole1* is X times as likely to *Part* as is Whole2.	*Whole1* is X% more likely to *Part* than is *Whole2*	*Whole1* is X times more likely to *Part* than is *Whole2*

* May include: likely to happen, likely to occur, likely to be found, etc.

Arithmetic Comparisons of a single Ratio In Two Conditions (Places or Times)
Test and Base are not Wholes. Percentage and Likely Grammar

Test and Base conditions could be places (Scotland versus Ireland) or times (2016 versus 2010). E.g., The percentage of men who died in 2016 vs. 2015. In this example, "died" is the common part, "men" is the common whole, and the years are the test and base conditions.

Percentage grammar includes share and fraction

Percentage Grammar Comparisons (Includes Proportion and Fraction)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The percentage of *Whole* who are *Part* is X percentage points more in/at *Test* than in/at *Base*	The percentage of *Whole* who are Part is X times as much in/at *Test* as [it is] in/at *Base*	The percentage of *Whole* who are *Part* is X% more in/at *Test* than in/at *Base*	The percentage of *Whole* who are *Part* is X times more in/at *Test* than in/at *Base*
Among *Whole*, the percentage who are *Part* is X percentage points more in/at *Test* than in/at *Base*	Among *Whole*, the percentage who are *Part* is X times as much in/at *Test* as in/among *Base*	Among *Whole*, the percentage who are *Part* is X% more in/at *Test* than in/among *Base*	Among *Whole*, the percentage who are *Part* is X times more in/at *Test* than in/among *Base*
Among *Whole*, the percentage of *Part* is X percentage points more in/at *Test* than in/at *Base*	Among *Whole*, the percentage of *Part* is X times as much in/at *Test* as in/among *Base*	Among *Whole*, the percentage of *Part* is X% more in/at *Test* than in/among *Base*	Among *Whole*, the percentage of *Part* is X times more in/at *Test* than in/among *Base*

Likely Grammar Comparisons			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
Part is X percentage points more likely* [prevalent] among *Whole* in/at *Test* than in/at *Base*	*Part* is X times as likely* [prevalent] among *Whole* in/at *Test* as in/at *Base*	*Part* is X% more likely* [prevalent] among *Whole* in/at *Test* than in/at *Base*	*Part* is X times more likely* [prevalent] among *Whole* in/at among *Test* than in/at *Base*
Whole is X percentage points more likely to *Part* in/at *Test* than in/at *Base*	*Whole* is X times as likely to *Part* in/at *Test* as in/at *Base*	*Whole* is X% more likely to *Part* in/at *Test* than in/at *Base*	*Whole* is X times more likely to *Part* in/at *Test* than in/at *Base*

* May include: likely to happen, likely to occur, likely to be found, etc.

Arithmetic Comparisons of Two Common-Part Ratios:
Test and Base are Wholes; Rate and Chance Grammar

Rate-clause grammar comparisons are not shown here.

Rate-Phrase Grammar Comparisons (Includes Prevalence & Incidence)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The *Part* rate of *Whole1* is X percentage points more than the *Part* rate of *Whole2*	The *Part* rate of *Whole1* is X times as much as the *Part* rate of *Whole2*	The *Part* rate of *Whole1* is X% more than the *Part* rate of *Whole2*	The *Part* rate of *Whole1* is X times more than the *Part* rate of *Whole2*
The *Part* rate is X percentage points more among/per *Whole1* than [it is] among *Whole2*	The *Part* rate is X times as much among/per *Whole1* as [it is] among *Whole2*	The *Part* rate is X% more among/per *Whole1* than [it is] among *Whole2*	The *Part* rate is X times more among/per *Whole1* than [it is] among *Whole2*
The rate of *Part* is Z percentage points more among *Whole1* than [it is] among *Whole2*	The rate of *Part* is X times as much among *Whole1* as [it is] among *Whole2*	The rate of *Part* is X% more among *Whole1* than [it is] among *Whole2*	The rate of *Part* is X times more among *Whole1* than [it is] among *Whole2*

Chance Grammar Comparisons (Includes Risk, Odds, Likelihood & Probability)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The chance of *Part* is X percentage points more among *Whole1* than among *Whole2*	The chance of *Part* is X times as much among *Whole1* as among *Whole2*	The chance of *Part* is X% more among *Whole1* than among *Whole2*	The chance of *Part* is X times more among *Whole1* than among *Whole2*
The chance of *Whole1 Parting* is X percentage points more than the chance of Whole2 *Parting*	The chance of *Whole1 Parting* is X times as much as the chance of *Whole2 Parting*	The chance of *Whole1 Parting* is X% more than the chance of *Whole2 Parting*	The chance of *Whole1 Parting* is X times more than the chance of *Whole2 Parting*
The chance that *Whole1* is *Part* is X percentage points more than the chance that *Whole2* is *Part*	The chance that *Whole1* is *Part* is X times as much as the chance that *Whole2* is *Part*	The chance that *Whole1* is *Part* is X% more than the chance that *Whole2* is *Part*	The chance that *Whole1* is *Part* is X times more than the chance that *Whole2* is *Part*

Arithmetic Comparisons of a single Ratio In Two Conditions (Places or Times)
Test and Base are not wholes; Rate and Chance Grammar

Rate-clause grammar is not shown here.

Rate-Phrase Grammar Comparisons (Includes Incidence and Prevalence)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The *Part* rate of *Whole* is X percentage points more in/at *Test* than in/at *Base*	The *Part* rate of/per *Whole* is X times as much in/at *Test* as in/at *Base*	The *Part* rate of/per *Whole* is X% more than in/at *Test* than in/at *Base*	The *Part* rate of/per *Whole* is X times more than in/at *Test* than in/at *Base*
The *Part* rate is X percentage points more among *Whole* in/at *Test* than in/at *Base*	The *Part* rate is X times as much among *Whole* in/at *Test* as in/at *Base*	The *Part* rate is X% more among *Whole* in/at *Test* than in/at *Base*	The *Part* rate is X times more among *Whole* in/at *Test* than in/at *Base*
The rate of *Part* is X percentage points more among *Whole* in/at *Test* than in/at *Base*	The rate of *Part* is X times as much among *Whole* in/at *Test* as in/at *Base*	The rate of *Part* is X % more among *Whole* in/at *Test* than in/at *Base*	The rate of *Part* is X times more among *Whole* in/at *Test* than in/at *Base*

Chance Grammar Comparisons (Including risk, Odds, Likelihood and Probability)			
Simple Difference	**Times Ratio**	**Percentage difference**	**Times difference**
The chance of *Part* is X percentages points more among *Whole* in/at *Test* than in/at *Base*	The chance of *Part* is X times as much among *Whole* in/at *Test* as in/at *Base*	The chance of *Part* is X% more among *Whole* in/at *Test* than in/at *Base*	The chance of *Part* is X times more among *Whole* in/at *Test* than in/at *Base*
The chance of *Whole Parting* is X percentages points more in/at *Test* than in/at *Base*	The chance of *Whole Parting* is X times as much in/at *Test* as in/at *Base*	The chance of *Whole Parting* is X % more in/at *Test* than in/at *Base*	The chance of *Whole Parting* is X times more than in/at *Test* than in/at *Base*
The chance that *Whole* is *Part* is X percentages points more in/at *Test* than in/at *Base*	The chance that *Whole1* is *Part* is X times as much in/at *Test* as in/at *Base*	The chance that *Whole1* is *Part* is X % more in/at *Test* than in/at *Base*	The chance that *Whole1* is *Part* is X times more in/at *Test* than in/at *Base*