



# Math for Journalists

**By Bob Baker**

I can remember it as though it were yesterday: A good reporter, confronted with a story that had certain mathematical issues, confessed to me: "I'm not good at math." She had no shame in her voice. She said it the way she might have said, "I'm not good at golf."

The difference, of course, is that we don't pay reporters to be good at golf. We pay them to be good at making sense of the world--which includes expressing simple mathematical relationships. And yet, a frightening proportion of otherwise smart reporters turn sluggish when it comes to using the kind of math that they were supposed to have mastered in high school. You can tell them that the population of Nafius, Tex., rose from 44,555 in 1990 to 76,592 in 2000 and they'll figure out the difference (32,037), but won't be quite sure what to divide the difference by. (Answer: You divide the difference by the base, or original, number, 44,555, to calculate the percentage increase of 71.9%.)

If you're one of those people who can't make that calculation easily--or if you fear you might be one of those people--take 15 minutes and read the two-page primer on math for journalists developed by my colleague on the L.A. Times Metro Desk, Jack Robinson. Jack routinely uses an appreciation for math and statistics to help the rest of us see probabilities, ratios and percentages more clearly.

As Jack said last year in a presentation on math to a group of Detroit journalists: "It's a powerful testament to the gulf between verbal and mathematical skills in modern America: We in daily journalism are deeply concerned with logic and consistency in words--but not in numbers. But treating numbers with the same care as words should be a natural extension of good journalism...Most of the math in daily papers is just elementary school stuff."

He threw out this example: In 2000, the Associated Press reported, and hundreds of newspapers published, a remark by President Clinton when he signed a bill on domestic abuse.

"Every 12 seconds," the President said, "another woman is beaten. That's nearly 900,000 victims a year."

Do the math yourself and watch what happens.

"One victim every 12 seconds means 5 per minute, 300 per hour, 7,200 in a day or more than 2.6 million a year--not 900,000," Jack said. "One of the two numbers in the quote is wrong--and no reporter or editor caught the mistake."

Scared you yet? Here's Jack's tip sheet:

## PERCENTAGES

Percentages are more useful than raw numbers if you want to compare two things without regard to their differing size--for example, to point out that one city has grown faster than another, even though they are very different in total population.

To calculate X as a percentage of Y: Divide X by Y and multiply the result by 100.

Example: Sunnymeadows Elementary School has 35 students from non-English-speaking homes and a total enrollment of 250. The percentage of students who come from such homes is:

$$(35 \text{ divided by } 250) \times 100$$

$$= 0.14 \times 100$$

$$= 14\%$$

If X is larger than Y, the result is a percentage greater than 100.

Example: The average test score at East High School is 300 and the average at West High School is 360. Thus the score at West, as a percentage of the score at East, is:

$$(360 \text{ divided by } 300) \times 100$$

$$= 1.2 \times 100$$

$$= 120\%$$

Another way to look at this is to say West's average is 20% higher than East's.

To calculate the percentage change from X to Y, calculate the difference and divide it by X. Then multiply by 100.

Example: Citrus City's budget was \$12 million last year and \$15 million this year. The percentage change is:

$$[(15 - 12) \text{ divided by } 12] \times 100$$

$$= [3 \text{ divided by } 12] \times 100$$

$$= .25 \times 100$$

$$= 25\%$$

Again, the change may be a decrease, resulting in a negative percentage.

Example: Last year's corn crop was 5 million tons; this year's crop was 4 million tons. The percentage change is:

$$[(4 - 5) \text{ divided by } 5] \times 100$$

$$= [-1 \text{ divided by } 5] \times 100$$

$$= -.20 \times 100$$

$$= -20\%$$

Remember that a 100% increase is a doubling, a 200% increase is a tripling, and so forth.

Example: Citrus Middle School reported 15 students absent on Wednesday and 45 students absent on Thursday. You can express this increase several ways:

--Absences tripled from Wednesday to Thursday.

--Absences increased 200% from Wednesday to Thursday.

--Thursday's total was 300% of Wednesday's total. (Note the wording: we're comparing the two numbers, not talking about the increase.)

## RATIOS AND RATES

A ratio describes the number of times larger one number is than another.

To calculate the ratio of X to Y, divide X by Y

Example: Citrus City High School has 1,200 students and 60 teachers. The student-teacher ratio is:

1200 divided by 60

= 20 to 1

A rate describes a number in terms of how it fits into a larger population, usually expressed on a per-hundred, per-thousand or similar basis.

To calculate the rate of X cases in a population of Y, divide X by Y and multiply by a basis number (such as 1,000)

Example: Citrus City had a population of 50,000 last year and police reported three homicides. The homicide rate was:

3 per 50,000

= 3 divided by 50,000

= 0.00006

Then multiply by the basis number to express it in various ways:

-- $0.00006 \times 1000 = 0.06$  per 1,000

-- $0.00006 \times 10,000 = 0.6$  per 10,000

-- $0.00006 \times 100,000 = 6$  per 100,000

## AVERAGES

An average, roughly speaking, is the midpoint of two or more numbers. Two kinds of averages are worth distinguishing:

A mean, or arithmetic average, is the most common kind.

To calculate the mean of X numbers, add up the numbers and divide by X

Example: Bill earned a B-minus, a B and a B-plus this semester. His grade-point average is:

$(2.7 + 3 + 3.3)$  divided by 3

= 9 divided by 3

= 3.00

A median, most often used to average dollar amounts to avoid distortion caused by a few extreme values, is the middle number in a series.

To calculate the median of several numbers, arrange them from smallest to largest and choose the middle number.

Example: Houses on Elm Street cost \$124,000, \$133,000, \$154,000, \$176,000 and \$2,000,000. The median price is the middle figure, \$154,000.

Repeated values count as separate numbers.

Example: The median of 85, 90, 100, 100, 100, 110 and 120 is 100.

Here are a few places on the Web you can go if you're still hungry:

Bruce Garrison, University of Miami offers:

[http://gehon.ir.miami.edu/com/classes/cnj216/math/v3\\_document.htm](http://gehon.ir.miami.edu/com/classes/cnj216/math/v3_document.htm)

An automatic percentage calculator for those who still don't get it:

<http://www.ibiblio.org/slanews/conferences/sla2001/internettoolsjh/ToolsCalculators/percent.html>

A math competency test for journalists, with answers:

<http://www.unc.edu/~pmeyer/carstat/resources.html>

A primer on math for journalists by Robert Niles of latimes.com:

<http://nilesonline.com/stats/>

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