

# Expressing paper thickness and density (paper weight)

## [\[edit\]](#) Grammage

Throughout the world, except in regions using US paper sizes, the product of thickness and density of paper is expressed in [grams](#) per [square metre](#) (g/m<sup>2</sup>). This quantity is commonly called *grammage* in both English and French ([ISO 536](#)), though printers in most English-speaking countries still refer to the "weight" of paper.

Typical office paper has a grammage of 80 g/m<sup>2</sup>, therefore a typical A4 sheet ( $\frac{1}{16}$  m<sup>2</sup>) weighs 5 g.

The unofficial unit symbol "gsm" instead of the standard "g/m<sup>2</sup>" is also occasionally encountered in English speaking countries.

While paper is measured by weight, card is measured by thickness in [micrometres](#).

## [\[edit\]](#) "Uncut" ream basis weight

In countries using U.S. paper sizes, paper density is often specified in [pounds](#). The stated mass is that of a [ream](#) of 500 sheets. However, the ream of that mass is normally *not* the one sold to the customer. Instead, the specified number of pounds is the mass of a "basis ream" in which the sheets have some larger size. Often, this is a size used during the manufacturing process before the paper was cut to the dimensions in which it is sold. So, to compute the weight per area, one must know

- the weight of the basis ream, which is labeled in pounds;
- the number of sheets in that ream, which is usually 500;
- the dimensions of an "uncut" sheet in that ream.

These "uncut" basis sizes vary between paper types, are not normally labeled on the product, are not formally standardized, and therefore have to be guessed or inferred somehow from trading practice. Common examples are:

17 in × 22 in   19 in × 24 in      20 in × 26 in  
 22 in × 28 in   22½ in × 28½ in   22 in × 34 in  
 24 in × 36 in   25 in × 38 in      25½ in × 30½ in

A benefit of this specification is that, when paper is cut to a smaller size, its specified weight in pounds does not change. "20 pound letter" paper and "20 pound ledger" paper are typically of the same

thickness and quality (although this is never guaranteed).

For conversion to grammage, in addition the ratio between [avoirdupois](#) pound and gram (1 lb ≈454 g) and between square inch and square metre (1 m<sup>2</sup> ≈1550 in<sup>2</sup>) are needed: 1 lb/in<sup>2</sup> ≈703.7 kg/m<sup>2</sup>.

For example, a "20 pound ream of Letter paper" has a weight of only 5 pounds if the basis dimensions used are twice the cut dimensions. Since the cut dimensions are 8½ in × 11 in, the "uncut" basis dimensions are probably 17 in × 22 in. Therefore, paper weight per area of this type of paper is likely to be:

$$\frac{20 \frac{\text{lb}}{\text{ream}} \times 1 \text{ sheet}}{17 \text{ in} \times 22 \text{ in} \times 500 \frac{\text{sheet}}{\text{ream}}} \approx 1.1 \times 10^{-4} \frac{\text{lb}}{\text{in}^2} \approx 75 \frac{\text{g}}{\text{m}^2}$$

Paper weight is sometimes stated using the "<#>" symbol. For example, "20#" means "20 pounds per basis ream of 500 sheets."

### [\[edit\]](#) M weight

When the density of a ream of paper is given in pounds, it is often accompanied by its "M weight". The M weight is the weight (in pounds) of 1000 cut sheets. Paper suppliers will often charge by M weight, since it is always consistent within a specific paper size, and because it allows a simple weight calculation for shipping charges.

For example, a 500-sheet ream of 20# copy paper may specify "10 M". Therefore, 1000 sheets (or two reams) will weigh 10 lb (4.54 kg).