

THE METRIC MILE

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In the United States we still use a modified English system of units for weights and measures. It has many funny things like: 4 quarts in a gallon, 16 ounces in a pound, 12 inches in a foot, 5280 feet in a mile etc. Why those numbers? The first three examples are easy to understand because they have nice factorization:

$$4 = 2 \times 2 = 2^2, \quad 16 = 2 \times 2 \times 2 \times 2 = 2^4, \quad 12 = 2 \times 2 \times 3 = 2^2 \times 3.$$

With these nice factors it is easy to see that a third of a foot is 4 inches and that half a gallon is two quarts.¹

But why are there 5280 feet in a mile?

First factor 5280 to find that

$$5280 = 2^5 \times 3 \times 5 \times 11.$$

But why these factors?

Clearly you want the factor 3 because there are 3 feet in a yard and since

$$\frac{5280}{3} = 1760$$

you have: There are 1760 yards in a mile.

Why all those 2s? There are $8 = 2^3$ furlongs in a mile. Today the only place I know that still uses a furlong is some horse races are measured in furlongs. The Kentucky Derby is 10 furlongs or $1 \frac{1}{4}$ miles long. It takes about 2 minutes to run the race.

Since

$$\frac{5280}{8} = 660, \quad \frac{660}{3} = 220$$

there are 660 feet or 220 yards in a furlong.

Where does the word furlong come from? A furrow is the trench in the ground made by a farmer when he plows a field. In medieval England farmers field must have been about 660 feet long, so furlong came from furrow + long.

Why the factor 11? You need to ask a surveyor. When places in the midwest where first being settled in the early 1800s land was measured in chains 66 feet long, so a surveyor's chain is 66 feet.² Since

$$\frac{5280}{66} = 80$$

there are 80 chains in a mile. When I lived in an old house on the Ohio River our house was on a lot that was 66 feet by 132 feet, i.e. 1 chain by 2 chains. In the English game of cricket the pitch, the distance between wickets, is 66 feet or 1 chain.

¹Half a gallon was called a pottle. Do you ever get a pottle of milk?

²Careful there is also an engineer's chain that is 100 feet long.

The factor of 5 comes from the informal distance unit of a pace of 5 feet – left foot to left foot when walking.³

I looked up mile in the Encyclopaedia Britannica and it said:

It originated from the Roman *mille passus*, or thousand paces, which measured 5,000 Roman feet.

About the year 1500 the old London mile was defined as eight furlongs. At that time the furlong, measured by a larger northern (German) foot, was 625 feet, and thus the mile equaled 5,000 feet. During the reign of Queen Elizabeth I, the mile gained an additional 280 feet to 5,280 under a statute of 1593 that confirmed the use of a shorter foot that made the length of the furlong 660 feet.

I like to kid my European friends who like the metric system by saying that the mile is a indeed a metric unit; it is a killopace.

³Sometimes in the US a pace is $2\frac{1}{2}$ feet – left to right.