

1762, proceeds entirely on such a direct numerical basis. The chronicle was cut into the bark of a tree in Ohio more than a century since, and it proceeds after the following straightforward manner:—Twenty-three braves went upon the warpath: therefore they represented twenty-three straight lines, bent slightly forward, to indicate progression. For ten days they marched through the forest: so the sun is displayed (with the very same broad good-humoured face he still wears in English caricature) as having surmounted ten lines, each of which marks the horizon. They attacked three English forts—shown by three square bastions; and one of them contained a couple of trading stores—exhibited as small oblongs within the fortifications. Ten vanquished enemies, each very much like an X with or without a head to it, stand on one side. Six of them, however, are headless, and represent the scalped. Four have small round knobs on top, and were, therefore, doubtless taken prisoners. This is, as it were, the raw material of the art-writing from which hieroglyphs and alphabets and numerical systems were finally evolved.

Still, the Roman V and X differ considerably, in one respect, from such Indian picture-writing, and show a corresponding advance in the direction of the numerals. They each represent not a particular object, but a number in the abstract. "*V hominis*" means five men; "*X homines*" ten men. It is not necessary to put pictures of the object five or ten times repeated; the figure alone sufficiently expresses the qualifying number. On the other hand, few people, probably, have any adequate idea of the great difficulties in which arithmetic would be involved were it not for the happy invention of the Arabic numerals. Here is a very simple little sum in addition put Roman fashion. The

reader will find it "a nice amusement," as the mode, papa always tells his daughters, to work it out as it stands without having recourse to Arabic notation:

MDCXLVIII
MCCXLV
DCCXXXIX
MDCCLXXXIV

None of these figures reaches two thousand, and yet what a hopeless task to sum them up without an abacus! But that is, indeed, a small matter. Here are two better tests of the impossibility of arithmetic without Arabic notation. Multiply (all in Roman figures) MDCXLIV by DCLXXXVI, and divide MCCXLIII by XLV. Nothing could be simpler than those two sums; and yet it requires considerable intellect and very close attention to work them out on paper with the Roman symbols.

The fact is, an abacus, which is at bottom merely a form of score, or tally, was absolutely indispensable for arriving at anything like a high arithmetical result before the invention of the Arabic numerals. The only way to work out a big sum was then to take one lot of pebbles or cowries to mark the units, another lot for the tens, a third lot for the hundreds, and a fourth for the thousands. If one wished to sum up a large number, say to add 2347 to 8929, one put separately into each heap two pebbles and eight, three pebbles and nine (which necessitated a remove or "carrying"), four pebbles and two, and nine pebbles and seven (carry again). No one heap, of course, could ever exceed ten; when it did, nine pebbles were taken out and one was removed to the next heap. Observe how this primitive method of reckoning has coloured all our subsequent arithmetical language and arithmetical conceptions. Just as digit means a finger, and points back to