

which definition *A* is based. And now let definition *A* be given,—it will now have for him a meaning.

We have given more space to this answer than the question would of itself justify, but we have noticed a tendency to accept as improvements definitions and descriptions that involve technical terms, as little or even less understood than the terms defined, and this too in works for beginners. The consequence is cramming with words, the worst kind of cramming, and too often cramming with what is false. We remember a teacher objecting to an Elementary Chemistry on the ground that it gave the old and not the new definition of an acid, yet on cross-questioning him it was discovered that all his ideas of an acid were really based on the old definition, and that he had not so far digested the new one as to recognize that while gelatinous silica, silicic acid is an acid, insoluble silica, a different substance, is not, for he actually objected that insoluble silica is not sour. Neither does it contain hydrogen. The only good point in the new definition is that it places acids among the hydrogen compounds, although it omits the type.

(Litmus paper is highly sensitive only when it contains the red principle combined with sub-carbonate of potash; commercial litmus paper often contains instead the sub-carbonate of lime forming a compound far less sensitive, in fact comparatively inert. Remove the calcium by immersing the paper in a weak solution of hydro-chloric acid.

The litmus paper test is at best a comparatively rude one, M. Shoenbein gives the following, which is of extreme delicacy. Act on iodide of amyl with lepidine forming cyanine blue. Treat the cyanine blue with soda, dissolve one part of the product in one hundred parts of alcohol, add to the solution twice its volume of water. This test will show the presence of carbonic acid in distilled water that has been merely breathed upon. Redden with an acid and we have a test for bases that will detect the trace of oxide of lead that is dissolved by water.

PROBLEMS.

113. A party consisting of twelve persons, men, women, boys, and girls stay at an inn. On settling their bill, \$12 in all, the men pay \$4 each, the women \$2 each, the boys \$½ and the girls \$¼ each. How many of each sex were there?

D. HICKS, Rose Hall.

114. A banker borrows at 3½ per cent. payable yearly and lends at 5 per cent. interest payable quarterly. He gains in one year £441. How much does he borrow?

E. T. HEWSON, Garnet.

115. Which is the greater—the cube root of 69 or the fourth root of 283. Solve by multiplication.

EDITOR.

CURIOSITIES.

6. Find the forms for two cubes whose sum is a square, also for two cubes whose difference is a square.

Our friends appear not to have cared to attack these problems which seem to be a little beyond the common Diophantine Analysis. We give the results, can they obtain them?

$$10 \ 2 \{ (m^2 + 3n^2) (m-3n)(m+n) - 12m^2 n^2 \} \\ \text{and } 16 \{ (m^2 + 3n^2) + 12m^2 n^2 \} \\ 20 \ 2 \{ (m^2 + 3n^2) (m+3n)(m+n) - 12m^2 n^2 \} \\ \text{and } 16 \{ (m^2 + 3n^2) + 12m^2 n^2 \}$$

We have in addition to 2°.

$$\{ (m^4 - 3n^4) + 6m^2 n^2 \}^3 - \{ (m^4 - 3n^4) - 6m^2 n^2 \}^3 \\ = 36m^2 n^2 (m^2 + 3n^2)^2$$

$$\{ (m^2 + 3n^2) (m+3n) (m+n) \}^3 \\ - \{ 4mn(m^2 + 3mn + 3n^2) \}^3 = \text{square.}$$

Putting  $m = n = 1$  in these latter and throwing out common factors gives

$$1^3 + 2^3 = 3^2 \text{ and } 3^3 - 7^3 = 1^3 2.$$

7. Solve

$$x^x = .207879457...$$

Neither have we received the solution of this curiosity.

It is  $x = j$  where  $j$  means the square root of negative unity. The interpretation is simple enough in double-algebra, but we have not space to enter on it.

SCHOOL BOOKS.

We have received from Mr. Wm. Bryce, Bookseller, London, specimens of Bartholomew's Primary School Drawing Cards and Slate. They are excellent and should be introduced into every school. The Cards are in three Nos. 10 c's. each. The slate of various sizes is about double the price of an ordinary slate, but is more strongly framed and protected at the corners with India rubber pads. It will in the end prove cheaper than the common slate not being so apt to break, besides it adds the comfort of being noiseless and is far finer in texture than the Faber slate.

NOTE.—Since the above was put in type we have received a letter from Mr. H. D. Johnson, of Exeter, in which he objects to the solution of Problem 4 of the First Class Arithmetic, page 266, September No. Mr. Johnson holds "that to make 25 per cent. currency on the purchase"

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