357. Powers of Numbers Whose Sum Is the Same Power of Some Number
Author(s): Artemas Martin
Source: *The Mathematical Gazette*, Vol. 6, No. 94 (Oct., 1911), pp. 158-159
Published by: Mathematical Association
Stable URL: http://www.jstor.org/stable/3603262
Accessed: 11-11-2015 18:15 UTC

357. [I. **18.** c.] *Powers of numbers whose sum is the same power of some number.*

Lest the readers of the *Gazette* who have not seen my publications on the subject might think Dr. Barbette the *discoverer* of the set of biquadrate numbers

$$4^4+6^4+8^4+9^4+14^4=15^4,$$

and of the set of fifth powers

$$4^5+5^5+6^5+7^5+9^5+11^5=12^5,$$

given in the review of his book on p. 95, No. 92 (May, 1911), it may be well to give briefly here a statement of the facts in connection with the history of these sets.

The set of biquadrate numbers whose sum is a biquadrate, given above, was communicated by the late Dr. David S. Hart, of Stonington, Conn., and given by me, with other sets, in a paper, "Methods of finding n^{th}-power Numbers whose Sum is an n^{th} Power," read at a meeting of the Mathematical Section of the Philosophical Society of Washington, Nov. 3, 1887, an abstract of which was published in the Bulletin of the Society, Vol. X., pp. 107–110, of the *Proceedings of the Mathematical Section*, thus antedating Dr. Barbette by 23 years!

The set of fifth-power numbers whose sum is a fifth power, given above, was discovered by the writer in Nov. 1887, and was given in the paper mentioned above 23 years before the appearance of Dr. Barbette's book. I also discovered, and gave in the same paper, the following set:

$$5^5+10^5+11^5+16^5+19^5+29^5=30^5,$$

which Dr. Barbette failed to "discover."

I also found

$$4^5+5^5+6^5+7^5+8^5+9^5+10^5+11^5+14^5+18^5+22^5=24^5,$$

and many other sets.

Dr. Barbette employs in his book the same tentative method, and practically the same notation that I did in my work done in 1887.

I published a paper, "About Biquadrate Numbers whose Sum is a Biquadrate," in the *Mathematical Magazine*, Vol. II., No. 10 (January 1896, Washington, D.C.), pp. 173–184. In that paper I found the following sets of five biquadrates whose sum is a biquadrate, which had also been communicated by Dr. Hart:

$$1^4+2^4+12^4+24^4+44^4=45^4,$$
$$4^4+8^4+13^4+28^4+54^4=55^4,$$
$$1^4+8^4+12^4+32^4+64^4=65^4.$$

Dr. Barbette finds only *one* set of five biquadrate numbers whose sum is a biquadrate number.

I published in the *Mathematical Magazine*, Vol. II., No. 12, pp. 285–296, a paper, "On Biquadrate Numbers," by Mr. Cyrus B. Haldeman, of Ross, Butler Co., Ohio, in which he finds by rigorous methods of solution many different sets of 5, 6, 7, 8, 9, etc., biquadrates whose sum is a biquadrate.

I contributed to the International Congress of Mathematicians held at Paris, August 9–12, 1900, a paper on biquadrates whose sum is a biquadrate, which was published in the *Proceedings of the Congress*, pp. 239–248, and later, with alterations, additions, and corrections, republished in Vol. II., No. 12, of the *Mathematical Magazine*, pp. 325–352, in which are found by rigorous formulas a great number of sets of biquadrate numbers whose sum is a biquadrate.

To the International Mathematical Congress held in connection with the World's Columbian Exposition, at Chicago, August 1893, I contributed a paper, "On Fifth-Power Numbers whose Sum is a Fifth Power," which was published in the *Congress Mathematical Papers*, Vol. I., pp. 168–174.

I have also found sixth-power numbers whose sum is a sixth power, discovering the first two sets August 31, 1891, and communicated them in a paper, "On Powers of Numbers whose Sum is the Same Power of Some Number," to the New York Mathematical Society, Oct. 3 of the same year, which paper was published in the *Quarterly Journal of Pure and Applied Mathematics*, Vol. XXVI. (London, 1893), pp. 225–227.

As they may be of interest to some readers of the *Gazette*, I will reproduce the two sets of six-power numbers here:

$$1^6+2^6+4^6+5^6+6^6+7^6+9^6+12^6+13^6+15^6$$
$$+16^6+18^6+20^6+21^6+22^6+23^6=28^6,$$

sixteen sixth-power numbers whose sum is a sixth power;

$$3^6+6^6+12^6+14^6+15^6+18^6+21^6+27^6+28^6+36^6+39^6+45^6$$
$$+48^6+54^6+56^6+60^6+63^6+66^6+69^6+70^6+98^6+126^6$$
$$+168^6+182^6+210^6+224^6+252^6+280^6+294^6+308^6+322^6=392^6,$$

thirty-one sixth-power numbers whose sum is a sixth power.

The writer is not aware that any person besides himself ever discovered any fifth-power numbers whose sum is a fifth power before the publication of Dr. Barbette's book, and he is not aware that *any* person but himself has ever discovered sixth-power numbers whose sum is a sixth power.

Dr. Barbette does not seem to be aware that any other mathematician had discovered these fourth-power and fifth-power numbers before he found them. It is certainly remarkable that he had not seen any of my papers, as they have been so widely disseminated. ARTEMAS MARTIN.

QUERIES.

(74) If the altitude of an isosceles triangle is equal to the base, prove that the perpendicular from the vertex on the base is divided in median section by the inscribed circle. Is this relation known? G. E. C. CASEY.

(75) From X, Z parallels XA, ZC are drawn. AZ and CX intersect in B. A parallel through B to AX or CZ cuts XZ in Y. Shew that

$$XA^{-1}+ZC^{-1}=YB^{-1}.$$

Has this been developed? It can be utilised in electricity, optics, etc.

W. R. BOWER.

ANSWER TO QUERY.

[**63, p. 119, vol. v.**] Goodman's Planimeter is a Hatchet Planimeter with an adjustable arm which can be set to the length of any figure (*e.g.* an indicator diagram), and thus the average height can be determined.

The mathematical theory of the instrument was given by the inventor Captain Prytz in *Engineering*, June 22nd, 1894, and another on similar lines was given by F. W. Hill in a paper read by him before the Physical Society and published in the *Philosophical Magazine*, Vol. 38, 1894.

There was also given in *Engineering*, May 25th, 1894, a geometrical proof, and another was given by Prof. Henrici in the *B.A. Report*, 1894, and in the article by him in the *Ency. Britt.* on "Mathematical Instruments."

J. A. TOMKINS.

ERRATA.

Pp. 128, 9. For fig. 2 read fig. 4; for fig. 3 read fig. 2; for fig. 4 read fig. 3.