

(1) By adopting Euclid's construction of cutting off equal segments AD, AE from the sides and proving as he does that the triangles ABE, ACD are equal in all respects, and then making D, E coincide with A, B respectively. The method of passing to limiting cases is highly instructive, the only question being as to the advisability of trying to introduce it to beginners, except as an experiment.

(2) By drawing a duplicate DEF of the triangle ABC (this operation being only a slight extension of the method of superposition used by Euclid in I. 4), and proving first that $\angle A = \angle E$ and $\angle B = \angle F$, and second that $\angle A = \angle F$ and $\angle B = \angle E$.

(3) By folding the triangle so as to bring AB into coincidence with AC. This is practically equivalent to bisecting the vertical angle, but it replaces a "hypothetical construction" by an operation which the beginner can easily perform.

The method of folding has many obvious advantages, and much would be gained if beginners could be taught at once to recognise cases in which one half of a figure could be brought into coincidence with the other half by folding. For example, the property that the common chord of two circles is bisected at right angles by the line joining the centres is obvious when it is recognised that one half of the figure is the fold of the other half. The method is, moreover, hardly more artificial than the method of superposition which Euclid himself employs.

It should be noticed that Euclid's proof of I. 4 involves an assumption which I have never seen pointed out, namely, that *two straight lines cannot touch one another*. If this be not assumed, then when the sides DE and AB are brought into coincidence, the sides DF and AC do not necessarily coincide even though they make the same angle with the same straight line and on the same side of it.

G. H. BRYAN.

The Zodiacal Light and Sun Pillars.

THE appearance on clear evenings of the zodiacal light after sunset at this season of the year in this latitude is usual, and it has been frequent and beautiful to observe in this district for many nights. It would be interesting if the readers of NATURE could detect any definite movement of the arm of light, for much yet remains to be discovered about this phenomenon, and any observer can make this point a study. From a short half-hour after sunset to from 8 to 9 p.m., a straight line drawn from the sun's position at sunset to the Pleiades will not remain the centre line of the zodiacal light. It appears to emanate from the sun and move as the luminous spoke of a wheel which has the sun for centre frequently, but not invariably. What makes the light apparently fade away? Is it that the motion of the earth has drawn with it the arc of volcanic or meteoric particles, which may be the medium of the light, away from the sun? or is it not possible that such a band of dust is lit with a degree of earth-shine? If so, may not this account for that other phenomenon of the Gergershein, which is usually brilliant in proportion to the brilliancy of the zodiacal light? Doubtless these phenomena are always present, but their visibility depends on the magnetic or electric condition of our atmosphere. Irritated by either of these conditions, the belts of dust would alter positions of all the bodies forming them, and so lie at a different angle and be clearer or dimmer accordingly.

The very remarkable sunset of March 6 has probably been observed by many readers of NATURE. The "fire-finger" left in a perfectly perpendicular position for upwards of fifty minutes after sunset was visibly withdrawn, without losing colour or size or changing from the perpendicular, and was a vivid and beautiful adjunct to a sunset afterglow strangely reminding one of the "Kakatoa sunsets" of years ago. This finger of fire the writer has only observed once before, after a similar-coloured sunset over the estuaries of the Medway and Thames last summer, but London smoke dimmed the effect. This rare appearance seemed on March 6 to resolve or be replaced by five vivid white rays with slight wheel motions from north to south, the largest of which eventually seemed the zodiacal light itself.

GUY J. BRIDGES.

Sutton Mandeville Rectory, Salisbury.

A PHENOMENON was visible here this evening which I think deserves to be recorded. We have an uninterrupted view of the western sky, and about a hundred pairs of sharp eyes are available, so that any unusual sunset is pretty certain to be noticed.

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Solar halos are comparatively common occurrences, and I have come to the conclusion that lunar rainbows are not so rare as is believed, but the "pillar of fire" which has been visible here for at least forty minutes is the most brilliant sight I or any of my oldest friends have ever witnessed. It was first observed at 6 p.m. just after the sun had disappeared, and was exactly vertical over the sun. The colour was at first silvery (resembling a searchlight) and later a golden yellow, the width equal to the sun's diameter, and the length 18° to 20° . A few light clouds seemed to pass behind it. Some observers noted a flickering and also a swaying motion, but this may have been an optical effect. At about 6.30 the colour had changed by gradations into a deep crimson-red, and for the next ten minutes it gradually became deeper in colour and shorter, disappearing at 6.40.

I may add that on February 20, 1901, I observed a very faint trace of a similar phenomenon.

Can any of your readers direct me to any literature bearing on the matter?

WM. A. KNIGHT.

Sexey's Trade School, Bruton, Somerset, March 6.

The Quadrantid Meteors.

MR. JOHN R. HENRY, according to his letters in NATURE of January 2 and 23, unfortunately looked out too late for the Quadrantids, owing to having miscalculated the time of maximum, the approximate probable time of which might also have been obtained from the British Astronomical Association. He is right in saying that the date of the shower is advancing into the year, but the advance is slower than he thinks. Taking the data he gives, which, however, are only very rough, and also a consideration of the sun's longitude as given in the "Nautical Almanac," there is an advance of only five hours in the thirty-seven years 1825 to 1862. It would appear that in the forty years from then a further advance of probably about eight hours has taken place. It is unfortunate that Prof. A. S. Herschel has not published the exact number of meteors he saw from hour to hour on January 2, 1900, when he watched from 11h. to 16h. 30m. He, however, states that the frequency continued about the same during the whole period, and seeing the radiant point was rising all that period, this would mean that the maximum was near the beginning of his watch.

Mr. Henry may be right in saying that the period of maximum fluctuates somewhat from year to year, though the data he gives are not sufficiently accurate to prove this; but I fail to see what ground he had for expecting the maximum so late as he did this year. Taking all the data into consideration, we might have expected the maximum to be about 23h. on the 2nd. I see no reason to doubt that this expectation was fulfilled; but as the maximum would occur in the daytime, observations in other countries would be necessary to prove this. The Quadrantids as seen here were most numerous on that morning.

It seems probable, therefore, that the time of the next maximum will be about 5h. on January 3, 1903.

T. W. BACKHOUSE.

West Hendon House, Sunderland, March 5.

Elementary Mathematics.

I WAS very glad to read in NATURE of January 30 (p. 297) the letter of Mr. J. W. Marshall on elementary mathematics, because all his suggestions referring to elementary algebra have already been realised in my book, "Applied Algebra," published in 1900 at St. Petersburg, in Russian.

I send, therefore, two copies of my book, one for the editor, the other for Mr. Marshall. The algebraical characters will permit every mathematician to judge somewhat of the character of a mathematical book without a knowledge of the Russian language. My compatriots have already condemned my heresy; but I hope that my ex-compatriots (our family is of Scottish origin, derived from Lehighmouth) will judge more liberally my attempt to improve the old method of teaching the prolific science of algebra.

The peculiarities of my exposition are explained by the fact that I wished to say all that was needed, and only what was needed. For that purpose it was necessary to put in the first place the systematical exposition of all the most fundamental methods of algebra which are sufficient for ordinary applications, and to postpone to a supplement all complicated questions that are usually combined with fundamental notions in the existing manuals, only producing a confusion in the minds of the pupils.