(3) Page 293, Ex. 349.

4285—2540—980=765 lbs. of soda and potash.

But 32 lbs. of soda unite with 49 of sulphuric acid.

$\therefore$ 1 lb. " unites " $\frac{49}{32}$ " "

And 1 lb. of potash " " $\frac{49}{48}$ " "

$\therefore$ $\frac{49}{32}$ of the soda + $\frac{49}{48}$ of the potash = 980 lbs.

$\therefore$ $\frac{1}{32}$ " + $\frac{1}{48}$ " = 20 "

3 times the soda + 2 times " = 1920 "

But 3 " " + 3 " " = 2295 "

$\therefore$ 1 " " = 375 "

$\therefore$ Soda = 765 − 375 = 390.

For P. J. B.—A and B begin business with capital in the proportion of 7:8. After 3 months they add respectively to their capitals $\frac{3}{4}$ and $\frac{5}{6}$ of their former investments, and at the end of the next 3 months each withdraws $\frac{1}{2}$ of his capital. At the end of the year their profits are $1652. How much should each receive?

A has 7 for 3 months.
A " $12\frac{1}{4}$ " 3 "
A " $6\frac{1}{8}$ " 6 "
B " 8 " 3 "
B " $14\frac{2}{3}$ " 3 "
B " $7\frac{1}{3}$ " 6 "

Divide in this proportion.

[Your other questions may be solved with a little outlay of mental vigor.]

For L. M. C.—Explain how you find all the divisors which a number has. Also how you find whether it is prime.

You are supposed to know the prime numbers in order, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, and so on indefinitely. Divide by each of these, beginning at the lowest, and you will find all the *divisors*, if there are any. If there are none, of course the number is prime.

In reply to "Subscriber"—First: A teacher who applies far advance of license, but not intending to attend the Normal School, is *not* required to forward a certificate of health to the Education Office.

Second: The amount of mathematics required at the preliminary examination for the first-class is given in Regulation 32 of the School Manual, namely:—Arithmetic, including the keeping of accounts by single entry; the first book of "Euclid" with easy exercises, and the elementary rules of Algebra, together with simple equations of one unknown quantity.

M. R. B.—Where can I buy natural history specimens and chemical apparatus in cheap lots?

The best houses for the purchase of minerals are: Dr. A. E. Foote, Philadelphia; Geo. L. English & Co., New York; Wiley, of Fredericton, and Brown & Webb, of Halifax, sell chemical apparatus at reasonable rates.

For E. G. S.—(1) If two lines be drawn from the extremities of the base of a triangle to bisect the opposite sides, the line joining their intersections with the vertex, if produced, will bisect the base.

Let ABC be a triangle on the base BC. Let the straight line BOE bisect AC in E, and COD bisect AB in D, then AO produced will bisect BC in F. Triangle AEB = the triangle ADC (each half of ABC).

$\therefore$ " DOB = " EOC (Ax. III.)
$\therefore$ " AOE = " ADO (Ax. I.)
$\therefore$ " AOB = " AOC (Ax. II.)

But they are on the same base, AO, and must have the same altitude, which is the same as being between the same parallels.

$\therefore$ The triangle BOF = the triangle COF (I. 37).
$\therefore$ The line BF = " CF (I. 40).

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(2) If any three circles, whose radii are known, be drawn touching each other externally, how can I find the enclosed area?

Join the centres of the circles by straight lines which will of course pass through the point of contact (cor. III. 12). A triangle will be formed of which the three sides are known. Its area and angles can therefore be found. The angles and radii of the circles been known, the areas of the enclosed sectors of the circles are easily found. The sum of these areas taken from the area of the triangle will leave the area of the space enclosed without the circles.

For W. L. T.—How do you account for the four years' omission in reckoning time?

If this question refers to the fact that the Christian era began four years after the birth of Christ we refer our readers to Ency. Brit., Vol. XIII, page 659. There we find it stated, that our present era was fixed by Dionysius Exiguus, who not having as many of the historical facts of that period at his command as modern chronologists, made a mistake of four years and placed the birth of Christ four years later than he should. After the date which he fixed had been accepted by all civilized nations, and used for many centuries, it became inconvenient to change it. However, the best authorities do not agree either as to the exact year or month on which it should begin.

For J. B. S.—Hamblin Smith's Arithmetic, page 166, Ex. 3.

Pipe A—pipe C empties the cistern in 40 hours.

$\therefore$ Pipe C—pipe A would fill it in 40 hours.

$\therefore$ Cistern $\frac{1}{4}$ filled by A + B in 1 hour.

" $\frac{1}{40}$ " C − A " "

" $\frac{1}{60}$ " B − C " "

$\therefore$ " $\frac{1}{4}+\frac{1}{40}+\frac{1}{60}=\frac{7}{24}$ filled 2 B's in 1 hour.

$\therefore$ " $\frac{7}{48}$ filled by B in 1 hour.

$\therefore$ " $\frac{1}{4}-\frac{7}{48}=\frac{5}{48}$ filled by A in 1 hour.

$\therefore$ B fills the cistern alone in $\frac{48}{7}=6\frac{6}{7}$ hours.

A " " " $\frac{48}{5}=9\frac{3}{5}$ "