

PHYSIOLOGY AND HYGIENE.

Grammar School and Class 4. Time, 30 minutes.

NOTE. Five questions, including No. 2, make a full paper.

1. What passages open into or pass out from the pharynx? State their relative position and their functions.
2. Explain the structure of the pelvis in relation to the spine and the lower limbs. What purposes are served by its peculiar form?
3. State what you know of the following, as to position and function: hyoid bone, ethmoid bone, liver, medulla oblongata, colon, pancreas, epiglottis, aorta.
4. How would you *prove* that bone is a mixture of earthy and animal matter? Give some idea of the mode in which these two are distributed. How is the nourishment of bone provided for?
5. Explain the significance of the terms physiology, organ, function, secretion, ferment.
6. State what you can as to the supposed action of alcohol as a "stimulant." What organs are "stimulated" and with what result?

ENGLISH LANGUAGE.

Class, 4. Time, 1 hour, 15 minutes.

1. Analyze both generally and particularly:

*Fewed I am
Of late with passions of some difference,
Conceptions only proper to myself,
Which give some soil, perhaps, to my behaviour;
But let not therefore my good friends be grieved,
Nor construe any further my neglect,
Than that poor Brutus, with himself at war,
Forgets the shows of love to other men.*

Value 15.

2. Parse the italicised words in the foregoing passage.
— Value 10.
3. State and illustrate the rule that determines the number of the verb when its subject is a collective noun.
— Value 15.
4. Give instances of Celtic, Latin and Danish remains in the English language, and state for what classes of words we have adopted chiefly Greek, Latin, and French derivatives. — Value 15.
5. Give the force of the affixes: Hood, less, some, ling, dom, en; illustrate your answer by examples. — Value 15.
6. Give the derivation of: Synod, calico, surgeon, treacle, sunset, tansy, hussy, custard, rival.
Value 15.
6. Give specimens of trochee, iambus, anapaest, amphibrach, and scan the following:
"When beggars die, there are no comets seen;
The heavens themselves blaze forth the death of princes."
Value 15.

QUESTION DEPARTMENT.

A. C. McL. The gross amount of a bill is \$50; but after two successive discounts at the same rate, the net amount is \$36.08. Find the rate of discount?

Suppose the question to be reversed: to find what per cent, after two successive additions, would give \$50. By the method of compound interest, if \$36.08 were given and also the rate, the amount would be found by adding the rate to 1, squaring the sum, and then multiplying by \$36.08 to get \$50. But the \$50 is given. Therefore the process is reversed. Dividing \$50 by \$36.08, you get 1.085969+. Extracting the

square root you have 1.0416, or 1.041. Subtract 1 and you have the rate, or .041 = $\frac{4}{100}$. If $\frac{4}{100}$ was added each time to get \$50 it is evident that $\frac{4}{100}$ subtracted would reduce it to \$36.08. Therefore the rate was $\frac{4}{100}$ or 4%.

NOTE. An exercise worked on the same principle is to be found in Hamblin Smith's Arithmetic, page 197, Ex. 5. It is not wise, however, to waste time looking for arithmetical solutions for algebraic problems.

A SUBSCRIBER. Please work the following question, which is found on page 72, Sec. VI, 4, Hamblin Smith's arithmetic. A sold a watch for one fifth more than it cost him to B, who sold it to C for \$36, which was one quarter less than it cost him. What did the watch cost A?

$\frac{1}{5}$ cost of watch to B	\$36.
$\frac{1}{5}$ " " "	\$12.
$\frac{1}{5}$ whole " "	\$48.
Again, $\frac{1}{4}$ cost of watch to A	\$48.
$\frac{1}{4}$ " " "	\$8.
$\frac{1}{4}$ whole " "	\$40.

H. S. G., BUCKINGHAM. You will find the solution of the problem asked for in the REVIEW of November, 1894.

SUBSCRIBER. John spent \$80 less than $\frac{1}{2}$ of his money at one time and at another \$40 more than $\frac{1}{2}$ of the remainder, and now has \$40 left. How much had he at first?

If he had not spent the \$40 more than $\frac{1}{2}$ he would have had \$80 left. But then having spent $\frac{1}{2}$ he had $\frac{1}{2}$ left \$80, therefore the whole \$140 left after the first spending. If at first he had spent the \$80 besides the $\frac{1}{2}$ he would have had $\frac{1}{2}$ left. But if he had spent the \$80 out of the \$140 he would have had \$60 or $\frac{1}{3}$ of what he had at first. Therefore he had \$180.

"GEOMETRY." (1). If two sides of a triangle are unequal, and if from their point of intersection three straight lines are drawn, namely, the bisector of the vertical angle, the median and the perpendicular to the base, the first is intermediate in position and magnitude to the other two.

Let ABC be the triangle. Let AB and AC be the two sides, of which AB is the greater. Let AD be perpendicular to BC. Let AP be the bisector of the angle BAC, and AN be the median.

Then angle DAC = complement of angle ACD.

And " DAB " " " ABD.

But " ACD is greater than " ABC.

Therefore " DAC is less than " DAB.

" " BAD is greater than half the vertical angle BAC.

Therefore AD lies within the angle PAC.

But by Ex. 12, AN lies within the angle BAP. Therefore AP lies between AD and AN. And by Ex. 3 it is intermediate between them in magnitude.