

We are given, $\frac{4}{100}A - \frac{7\frac{1}{2}}{100}B$, and $\frac{12\frac{1}{2}}{100}B - \frac{20}{100}C$.

$\therefore 4A - 7\frac{1}{2}B$, and $12\frac{1}{2}B - 20C$.

Multiplying the first of these equations by 10 and the second one by 6 gives $40A - 75B$, and $75B - 120C$.

$\therefore A - 3C$, and $B - \frac{2}{3}C$.

And $A + B + C = 3C + \frac{2}{3}C + C = \frac{8}{3}C$
 $\therefore 916 = \frac{8}{3}C$

$$\therefore C = \frac{916 \times 3}{8} = 343\frac{1}{2}$$

$$A - 3C = 490\frac{1}{2}$$

$$B - \frac{2}{3}C = 261\frac{1}{2}$$

And the sum is \$916.

5. What sum of money would amount to \$1406.08 in 3 years at 4% per annum compound interest.

The amount for a given term of years at a given rate will be proportional to the sum invested.

Therefore, assume an investment of \$100.

In one year it amounts to \$100 and interest on \$100 = \$104

In the second year it amounts to \$104 + interest on \$104 = \$108.16.

In the third year it amounts to \$108.16 + interest on \$108.16 = \$112.4864.

But the amount should be \$1406.08.

$$\therefore \$112.4864 : \$1406.08 :: 100 : \text{sum required}$$

$$\therefore \text{sum} = \frac{1406.08 \times 100}{112.4864} = \$1250.$$

Otherwise, if p be the sum invested, t be the time in years, and r be the rate per unit

The amount for 1 year is $p + pr = p(1+r)$; the amount for 2 years is $p(1+r)(1+r) = p(1+r)^2$; similarly, the amount for three years $p(1+r)^3$; and this is \$1406.08.

$$\therefore p = \frac{1406.08}{(1+r)^3} = \frac{1406.08}{(1.04)^3} = \frac{1406.08}{1.124864} = \$1250.$$

6. A note was discounted at a bank 120 days before it was due, at the rate of 7%, and the proceeds were \$35.66. For what amount was the note drawn?

The bank discount on \$100 at the given rate and time is simply the interest. Therefore it is

$$100 \times \frac{7}{100} \times \frac{120}{365} = \frac{7 \times 120}{365}$$

And the proceeds (remainder) is $100 - \frac{7 \times 120}{365} = \frac{35660}{365}$ which by the question should be 35.66.

$$\therefore \frac{35660}{365} : 35.66 = 100 : \text{amt. required.}$$

$$\text{Or amount required} = \frac{100 \times 35.66}{35.66} = \$36.50.$$

Otherwise, if p be the face value of the note the bank discount is

$p \times \frac{7}{100} \times \frac{120}{365}$ and the proceeds = $p - \text{bank discount} = p \left(1 - \frac{7 \times 120}{36500}\right) = \frac{35660}{36500}$ and this must be 35.66.

$$\therefore p = 35.66 \times \frac{36500}{35660} = \$36.50$$

7. If copper weighs 500 lbs., lead 600 lbs., tin 480 lbs., respectively to the cubic foot, find the weight of a cubic foot of metal composed of equal weights of copper, lead and tin.

As one cubic foot of copper weighs 500 lbs., \therefore 1 pound of copper = $\frac{1}{500}$ cubic ft. Similarly, 1 pound of lead = $\frac{1}{600}$ cubic ft.; 1 pound of tin = $\frac{1}{480}$ cubic ft. Adding, \therefore 3 pounds of alloy =

$$\frac{1}{500} + \frac{1}{600} + \frac{1}{480} \text{ cubic ft.} = \frac{23}{4000} \text{ cu. ft.}$$

$$\text{Hence 1 cubic ft. alloy} = \frac{4000}{23} \times 3 =$$

521.74 lbs.

8. Bank of Commerce Stock is divided into shares of \$50.00 each. Bank of Montreal Stock into shares of \$100.00 each. A person holding 220 shares of the former sells when it is quoted at 146, and purchases with the proceeds an integral number (and the greatest number possible) of shares of the latter stock when it is quoted at 248, and deposits the balance of the proceeds in a savings bank which pays interest at the rate of 3% per annum. Find the change in his yearly income caused by change of investment, if Bank of Commerce Stock pays an annual dividend of 7% and Bank of Montreal Stock an annual dividend of 12%.

220 shares B. of C. stock at \$50 per share = \$11000. Selling at \$146 for every 100 gives $\frac{146}{100} \times 11000 = \16060 ,

which is the money received from his sale.

He buys B. of M. stock by giving \$248 for each \$100 of stock.

Now 248 is contained in 16060, 64 times with a remainder of 188.

Therefore, he buys 64 shares of B of M stock and puts \$188. in the savings bank.

Hence, he begins with \$11,000. in B of C stock and receives 7% interest = \$770. yearly.

He ends with \$6400. in B of M stock and receives 12% interest = \$768.

With \$188 in S. B. at 3% interest = \$5.64.

Receipts at first = \$770.

" " last = \$773.64.

Gain = \$3.64.

Remarks: Questions 2 and 4 are not really arithmetical but algebraical, and would be solved by algebra by people acquainted with algebra.

Question 8 is unnecessary long in its wording and by its abundance of words appears more formidable than it really is.