

$$1 - \frac{(n+2)(n+3)-2}{(n+4)(n+5)-2} \quad \frac{2}{(n+4)^2},$$

or $\tan^{-1} \frac{(n+3)(n+4)-2}{(n+5)(n+6)-2}$

Hence, since the law has been shewn to be true for five terms, it is true for six, and therefore for seven, and thence generally.

Therefore sum of series $\tan^{-1} \frac{2}{3^2} + \tan^{-1} \frac{2}{4^2} + \&c.$ to n terms is $\tan^{-1} \frac{(n+2)(n+3)-2}{(n+4)(n+5)-2}$; and as n approaches infinity, this approaches $\tan^{-1} 1 = \frac{\pi}{2}$. The first two terms being $\frac{\pi}{2}$, the total sum is $\frac{3\pi}{4}$.

With respect to problem 5, Mr. Hay thinks the solution can be effected, and offers the following, which undoubtedly is correct:

Let C be the point from which the streets branch; D the point where the sewer meets the river; F the point in AC from which the drain is constructed.

Then angles ACD , BCD are equal, also angles ADF , CDF .

Let $CD = x$, $AC = y$. $AD = 6$, $AF = 4$, $DB = x - 11$;

$AC : CB :: AD : DB$ (Euc. VI. 3);

$\therefore y : CB :: 6 : x - 11$, or $CB = \frac{1}{3}y(x - 11)$.

Also $AD : DC :: AF : FC$ (Euc. VI. 3),

$6 : x :: 4 : y - 4$, or $y = \frac{1}{3}(2x + 12)$.

Again, $9\{y + \frac{1}{3}y(x - 11)\} = \text{cost of drains down both } CA \text{ and } CB = £54 \text{ more than cost of sewer} = xy + 54$. From this $xy - 15y = 108$; $\therefore$ substituting above value of y , $\frac{x}{3}(2x + 12) - \frac{1}{3}(2x + 12) = 108$, $x^2 - 9x = 252$, $x = 21 = CD$. Also, $AC = y = \frac{1}{3}(2x + 12) = 18$; $CB = \frac{1}{3}y(x - 11) = 30$.

J. A. C.—You have not read this problem correctly, taking cost of sewer as many £'s per chain as there were chains in both CA and CB , instead of CA alone.

The following solution of problem 6 has been given with slight alterations by J. A. Clark, Picton; R. Coates, Lowville; A. W. D. Knapp, St. John Cy., New Brunswick; J. E. Dean, Millidgeville, N. B.; A. Hay, Kingston; U. Sharpe, Trenton:

4 ac. with growth for 6 weeks keep 12 oxen for 6 weeks.

Also 5 " " 2 " 35 " 2 "

$\therefore$ 1 " " 6 " 3 " 6 "

And 1 " " 2 " 7 " 2 "

$\therefore$ 1 " " 6 " 18 " 1 "

And 1 " " 2 " 14 " 1 "

Hence growth of 1 ac. for 4 weeks keeps 4 oxen for 1 week; or growth of 1 ac. for 1 week keeps 1 ox for 1 week.

Now 4 acres with growth for 6 weeks keeps 12 oxen for 6 weeks; and from above the growth alone on these 4 acres must maintain 4 of the oxen; hence the grass that was on 4 acres at the beginning maintained 8 oxen for 6 weeks, or 48 oxen for 1 week. Therefore the grass standing on 1 acre at the beginning maintained 12 oxen for 1 week.

Again, since growth of 1 acre for 1 week keeps 1 ox for 1 week, and since B is entitled to the growth, he may keep 12 oxen for the 8 weeks, there being 12 acres.

Also, since grass standing on 1 acre at beginning will maintain 12 oxen for one week, and since A is entitled to this, he may keep 144 oxen for 1 week, (there being 12 acres) or 18 oxen for 8 weeks.

A maintaining 18 oxen and B 12 for the same time, the rent, \$120, must be divided into parts, \$72 and \$48.

J. A., of Mimico, and U. S., of Trenton, gave algebraic solutions. It would have been well, in stating what x and y represented, had they said that the unit was the amount required to keep one ox for one week.

Mr. Anderson, Mimico, obtains a correct result for problem 7.

1. W. J. Brice, Watford, asks whether the following can be solved by means of the First Book alone: AB , AC are two given straight lines; B and C given points in the same. BD and DE are drawn perpendicular to AC and AB ; and CF and FG perpendicular to AB and AC . Prove that EG and BC are parallel.

2. Bisect a trapezium by a line drawn from one of its angles.

J. E. DEAN, Portland.

3. Sold lumber on commission at $6\frac{1}{2}$ per cent. Invested net proceeds in salt at 4 per cent. commission. My whole commission was \$186.50. What were the values of the lumber and salt?

4. I bought a quantity of tea at \$1.15 per lb. Allowing that the tea will fall short 7 per cent. in weighing it out, that duty, carriage, &c., will be 19 per cent., and that 12 per cent. of sales will be in bad debts, for how much per lb. must I sell it to make a clear gain of 25 per cent.?

SUBSCRIBER, Lansdowne.—The most lucid is the usual solution, — in effect, an algebraic one. Your second is too easy.

MECHANIC, London.—Your problem is too easy, being merely a question of accuracy in the simple rules.

Practical Department.

CONVERSATIONAL COLUMN.

1. *What errors in pen holding would you correct most carefully?*

All errors should be corrected carefully, and when the pupil first begins to write. Teach pen holding while the pupils are using the tracing books, so that they may be able to give the subject their undivided attention. The errors most frequently made in holding the pen, and which lead to the most serious results, are:

1. Resting the hand on the side.
2. Resting the wrist on the paper.
3. Writing with the side of the pen or with only one of its points.
4. Holding the pen too near the point.
5. Bending the first and second fingers so as to leave a space between the first finger and the holder.
6. Holding the pen too tightly.

2. *How can pupils be made to understand and remember the proper position for pen holding most easily?*

By a careful explanation of a picture of the hand with the pen in proper position. Such a picture is usually printed on the cover of a good series of copybooks. It will not be sufficient, however, to explain the proper position. The teacher will require to watch constantly to prevent relapsing into erroneous positions. He should stand during the writing hour occasionally, where he could see the hands of the whole class, and correct every mistake made. He should do it quietly. It will be more necessary, as a rule, to say, so as not to attract the attention of any but the pupil meant, "Smith, hand off side;" "Jones, knuckles toward ceiling;" "Brown, too close to point," &c.

Some pupils have much difficulty in taking hold of the pen properly. It is a good plan to have special holders for such with indentations at the points of contact of the holder with the thumb and fingers.

Mr. Adam Morrison, Principal of Niagara St. School, Toronto, adopts a method of securing good pen holding which is eminently successful. He makes pen holding a home exercise in drawing. The pupils have the picture referred to above explained, and the teacher draws it on the black-board as he proceeds with his explanation. The pupils then draw the hand on their slates; and have their errors pointed out until they can draw the hand with the pen in proper position from memory.

In this way every point must be definitely, and very soon in-