E. J. B.—Through the columns of THE EDUCATIONAL REVIEW, please give solutions of the following problem ·

1. If $a + b$ varies as $a - b$, prove that $a^2 + b^2$ varies as ab ; and if a varies as b, prove that $a^2 - b^2$ varies as ab. P. 211; Example 18.

Let $a + b = m (a - b)$, where m is constant.

Then $a^2 + 2ab + b^2 = m^2(a^2 - 2ab + b^2)$;

Or $2ab + 2abm^2 = m^2(a^2 + b^2) - (a^2 + b^2)$;

Therefore $a^2 + b^2 = \dfrac{2(1 + m^2)}{m^2 - 1}ab$

" $a^2 + b^2$ varies as ab.

Again, let $a = mb$, where m is constant.

Then $a^2 - b^2 = m^2b^2 - b^2$

$= (m^2 - 1)b^2$

$= \left\{ \dfrac{m^2 - 1}{m} \right\} ab$

Therefore $a^2 - b^2$ varies as ab.

2. If a, b, c, d be in A. P., a, e, f, d, in G. P., a, g, h, d in H. P. respectively ; prove that $ad = ef = bh = cg$. P. 291 ; Example 25.

By Art. 296 we have $ad = ef$.

By the A. P. we have $a - b = b - c = c - d$;

Therefore $2(a - b) = b - d$, and $2(c - d) = a - c$;

" $b = \dfrac{2a + d}{3}$ and $c = \dfrac{2d + a}{3}$

By the H. P. $\dfrac{1}{a} - \dfrac{1}{g} = \dfrac{1}{g} - \dfrac{1}{h} = \dfrac{1}{h} - \dfrac{1}{d}$

From these equations it may be easily found that

$h = \dfrac{3ad}{2a + d}$, and $g = \dfrac{3ad}{2d + a}$

Therefore $bh = \dfrac{2a + d}{3} \times \dfrac{3ad}{2a + d} = ad$

And $cg = \dfrac{3ad}{2d + a} \times \dfrac{2d + a}{3} = ad$.

3. A railway carriage will accommodate 5 passengers on each side, in how many ways can 10 persons take their seats when two of them decline to face the engine, and a third cannot travel backwards. P. 306 ; Example 12.

The seven persons who can sit on either side would be divided into two groups of 3 and 4 respectively. This can be done in $7C_3$ ways.   Each side admits of $\underline{|5}$ arrangements.

Therefore the required number $= 7C_3 \times \underline{|5} \times \underline{|5}$

$= \dfrac{7 \cdot 6 \cdot 5}{1 \cdot 2 \cdot 3} \times 120 \times 120$

$= 504000$.

3. Shew that

$$^{n+1}C_r = {^nC_r} + {^nC}_{r-1}.$$

$^nC_r + {^nC}_{r-1} = \dfrac{\underline{|n}}{\underline{|r}\ \underline{|n-r}} + \dfrac{\underline{|n}}{\underline{|r-1}\ \underline{|n-r+1}}$

$= \dfrac{\underline{|n}}{\underline{|r}\ \underline{|n-r+1}} \left\{ n - r + 1 + r \right\} = \dfrac{(n+1)\underline{|n}}{\underline{|r}\ \underline{|n-r+1}}$

$= \dfrac{\underline{|n+1}}{\underline{|r}\ \underline{|n+1-r}} = {^{n+1}C_r}$

SCHOOL AND COLLEGE.

Carleton County Teachers' Institute meets at Hartland on on the 13th and 14th October.   Chief Superintendent of Education Dr. Inch will be present.

Rev. Dr. Ambrose, D.C.L., died September 19th at his home in Sackville, N. S.   He was one of the founders of the Halifax Institute of Natural Science.

Mr. Frank Allen, who recently resigned the principalship of the Shediac schools to take a position on the Moncton High School staff, was presented by his friends in Shediac with an address, accompanied with a gold-headed cane.

Principal Oulton, of the Moncton High School, was presented with a handsome travelling case by his fellow teachers on the eve of his departure for McGill University, where he is taking a post-graduate course.

Few country school districts present a better appearance, both as to house and grounds, than Chance Harbor, St. John County.   Miss Emma Gillies, the capable and energetic teacher, has been instrumental in raising and expending nearly fifty dollars in improvements of various kinds.

Miss Addie Calder, teacher at Fair Haven, Charlotte Co., has recently, by means of a school entertainment, added to her school appliances.

Professor Alexander Graham Bell, the inventor of the telephone, owns a whole mountain of 1,000 acres in Baddeck, C.B., upon which he has expended $200,000 on roads. Upon its southern slope up toward the summit, and overlooking a wide panorama of lake and mountain, he has erected a $35,000 residence, and near it a fully equipped laboratory, where he conducts his experiments in electricity.

Inspector Carter hopes to complete his work in Charlotte County during October.   He expects some time during that month to address a public meeting of those interested in the public schools at Beaver Harbor.

There are no papers devoted to education exclusively in Maine, nor is there any means whereby papers of exceptional merit read at institutes may confer benefit upon others.   The very excellent paper on "Physical Culture," read before the Penobscot association by Miss Flora Mason, of the Springfield Normal School, should have the widest circulation, according to the opinion of those who heard it.

Ten of the teachers of the Windsor, N.S., schools, at the time of the fire, have been re-engaged, and are teaching in the best buildings to be obtained at present.   It is expected that the new school building, which will be one of the best in the province, will be formally opened about the middle of November.

Hantsport has secured Miss Mary Burgoyne in the preparatory department, in place of Miss Maggie Burton, who resigned at the end of last term.   To increase the efficiency of the High School department, another department will be opened very soon.

The County Academy in Kentville opened with a large attendance and the prospect of a very good year.   Miss Mary McKay and Miss Theresa Farrell, who obtained Class A licenses as the result of the recent examination, have been added to the staff of teachers.   These fill the vacancies caused by the resignation of Miss Jennie Ross and Miss Mabel Caldwell.   Mr. Angus McLeod is still principal, and Miss Bertha B. Hebb vice-principal.

Miss Bessie Lewis, Class A, has been appointed principal of Maitland High School, in Hants County.   Mr. J. S. Layton, who was principal last year, has become principal of Annapolis Academy.