of the equation, $3x^2 + ax + 2 = 0$, a being supposed to be distinct from zero. Inquire whether the theorem holds good when a is zero.

4. Find in how many ways 12 guineas may be made up of half-guineas and half-crowns.

SOLUTIONS.

1. Let $12 + x$ P.M = correct time in hours.

Then $\frac{12+x}{12} = \frac{12 + x + \frac{2\frac{1}{180}}{60}}{12+x}$; $\therefore (12+x)^2 - 12(12+x) = \frac{361}{900}$.

$\therefore x^2 + 12x = \frac{361}{900}$ and $x = \frac{1}{30}$ hrs, or $12\frac{1}{30}$ P. M = c. t. A in $12\frac{1}{30}$ hrs. gains $2\frac{1}{180}$ m. $\therefore$ in 1 hr. A gains 10 seconds and C in one hr. loses $9\frac{351}{361}$ seconds.

2. Let x = No. of its own leaps the hare was ahead of g. h. at starting. Hare takes 12 leaps in m seconds and hound 9 leaps in same time. 9 of hound's leaps = $13\frac{1}{2}$ hare's leaps. $\therefore$ hound gains $1\frac{1}{2}$ hare's leaps in m seconds.

$\therefore$ hound gains $\frac{1}{2}x$ leaps in $\frac{mx}{3}$ seconds.

Again, 9 leaps in m sec. $= \frac{9n}{m}$ in n sec. $\therefore$ increased rate $= \frac{9n}{m} + 1$ in n sec. wh. $= \frac{9n+m}{9n}$ of former rate. $\therefore$ time for 2nd half $= \frac{9n}{9n+m}$ of time for 1st half $= \frac{mx}{3} \times \frac{9n}{9n+m}$. $\therefore \frac{mx}{3} - \frac{mx}{3} \times \frac{9n}{9n+m} = t$.

$\therefore x = 3t\left(\frac{m+9n}{m^2}\right)$.

3. (*a*), $(m+n)pq = p + q$; (*b*), $(m+n) = (p+q)mn$. I Eq. $x^2 + \frac{a}{2}x + \frac{3}{2} = 0$. Since m and n are the roots, $-\frac{a}{2} = m + n$, and $\frac{3}{2} = mn$. II Eq. $x^2 + \frac{a}{3}x + \frac{2}{3} = 0$ $\therefore -\frac{a}{3}$ = sum of roots, and $\frac{2}{3}$ = prod. of roots. Substitute in (*b*) the values of $(m+n)$ and mn; then $-\frac{a}{2} = \frac{3}{2}(p+q)$ $\therefore p + q = -\frac{a}{3}$

Again, $-\frac{a}{2} \times pq = -\frac{a}{3}$ $\therefore pq = \frac{2}{3}$ $\therefore p$ and q are the roots of $3x^2 + ax + 2 = 0$.

4. Let x and y denote the number of ½ crowns and ½ guineas, then $5x + 21y = 504$. $\therefore$ it can be paid in 4 ways.

Solutions of First Class Algebra Paper for July, 1873, the remainder of those for December, 1873, and of the Intermediate Philosphy, December, 1878, were prepared for this Number, but, having been crowded out, they will appear in our next issue.