

things like what our forefathers denounced under the name of "unlaw;" so long as the teaching interest is unrepresented in the Council that virtually governs; so long such a review as the EDUCATIONAL MONTHLY is the best resource for redress. The most hopeless feature of the case hitherto has been a want of public interest

in educational questions. This the friends of education have it in their power to remedy to a great and increasing extent, by promoting the circulation of the EDUCATIONAL MONTHLY, and by writing themselves and endeavouring to interest others in the important questions discussed in its columns.

ARTS DEPARTMENT.

ARCHIBALD MACMURCHY, M.A., MATHEMATICAL EDITOR, C. E. M.

Our correspondents will please bear in mind, that the arranging of the matter for the printer is greatly facilitated when they kindly write out their contributions, intended for insertion, on one side of the paper ONLY, or so that each distinct answer or subject may admit of an easy separation from other matter without the necessity of having it re-written.

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SOLUTIONS.

BY THE PROPOSERS.

$$\begin{aligned} 56. \text{ Solve } x + y + z &= 41 \quad (1) \\ x^2 + y^2 + z^2 &= 49 \quad (2) \\ yz &= 3x(y-z) \quad (3) \end{aligned}$$

Subtract (2) from the square of (1), and divide by 2:

$$xy + yz + zx = 36.$$

$$\text{Hence, and from (3)} \quad \frac{36 - xz}{x+z} = y = \frac{3xz}{3x+z}.$$

Substituting these values of y successively in (1),

$$3x^2 + 7xz + z^2 = 11(3x+z) \quad (4)$$

$$x^2 + xz + z^2 = 11(x+z) - 36 \quad (5)$$

Multiply (5) by 3 and subtract from (4);

$$\text{hence } 4xz - 2z^2 = -22z + 108$$

$$\therefore x = \frac{z^2 - 11z + 54}{2z}$$

$$x+z = \frac{3z^2 - 11z + 54}{2z}, \quad xz = \frac{z^2 - 11z + 54}{2}.$$

Substituting in $(x+z)^2 - 11(x+z) = xz - 36$.

$$\begin{aligned} \left(\frac{3z^2 - 11z + 54}{2z} \right)^2 - 11 \left(\frac{3z^2 - 11z + 54}{2z} \right) &= \\ \frac{z^2 - 11z - 18}{2}; \end{aligned}$$

$$\therefore \frac{3(3z^2 - 11z + 54)}{2z^2} = \frac{z^2 - 11z - 18}{z^2 - 11z + 18}.$$

Subtracting both sides from (4) we get

$$-\frac{z^2 + 33z - 162}{2z^2} = \frac{3z^2 - 33z + 90}{z^2 - 11z + 18};$$

$$\therefore -\frac{(z-6)(z-27)}{2z^2} = \frac{3(z-5)(z-6)}{(z-2)(z-9)};$$

$$\therefore z-6=0, z=6, x = \frac{54-6 \times 5}{2 \times 6} = 2 : y=3.$$

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84. In the equation $ax^2 + bx + c = 0$, find both values of x in the following cases:

1st, $a=0$; 2nd, $c=0$; 3rd, $a=c=0$;

4th, $b=c=0$; and 5th, when $a=b=0$.

1st, $x=\infty$, and $-\frac{c}{b}$; 2nd, $x=0$, and $-\frac{b}{a}$;

3rd, $x=\infty$ and 0 ; 4th $x=0$ and 0 ; 5th, $x=\infty$ and ∞ .

We have

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{2c}{-b \mp \sqrt{b^2 - 4ac}}.$$