Answer script

Algebraic ratio and proportion

(Barkatul alam tipu)

<u>Answer to the qo,no1/a</u>

$\frac{2x-y}{x-2y}$ = $\frac{a}{b}$

Or, a(x-2y) =b(2x-y) { cross multiply)

Or, ax-2ay=2bx-by

Or,ax-2bx=2ay-by

Or, x(a-2b)=y(2a-b)

$\frac{x}{y}$ = $\frac{(2a-b)}{(a-2b)}$ Ans.

<u>Answer to the qo. No 1/b</u>

Given x = $\frac{3}{5}$,

Or,$\frac{1}{x}$ =$\frac{5}{3}$ [Invertendo]

Or, $\frac{1+x}{1-x}$ = $\frac{5+3}{5-3}$ [cmponando-divinando]

Or, $\frac{1+x}{1-x}$ = $\frac{8}{2}$

Or , $\frac{1+x}{1-x}$ = 4

Or,$\frac{\sqrt{1+x}}{\sqrt{1-x}} = \sqrt{4}$ [square root]

Or, $\frac{\sqrt{1+x}}{\sqrt{1-x}} = \pm 2$

Or,$\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}=\frac{2+1}{2-1}$ again, $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}$=$\frac{-2+1}{-2-1}$ [cmponando-divinando]

Or, $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}$ =3 again, $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}=\frac{1}{3}$ [ans]

Answer 1/c

Given, $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}$ P

Or,$\frac{\sqrt{1+x}+\sqrt{1-x}+\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}-\sqrt{1+x}+\sqrt{1-x}}$ =$\frac{p+1}{p-1}$ [cmponando-divinando]

Or.$\frac{2\sqrt{1+x}}{2\sqrt{1-x}}$ =$\frac{p+1}{p-1}$

Or, $\frac{1+x}{1-x}=$ =$\frac{(p+1)^2}{(p-1)^2}$ [squaring both sides]

Or,$\frac{1+x+1-x}{1+x-1+x}$ =$\frac{(p+1)^2+(p-1)^2}{(p+1)^2-(p-1)^2}$ [cmponando-divinando]

Or,$\frac{2}{2x}$ =$\frac{p^2+2p+1+p^2-2p+1}{p^2+2p+1-p^2+2p-1}$

Or,$\frac{2}{2x}$ =$\frac{2p^2+2}{4p}$

Or, $\frac{1}{x}$ =$\frac{2(p^2+1)}{4p}$

Or, x (p^2+1)=2p [cross-multiply]

Or,$p^2+1=\frac{2p}{x}$

Or,$p^2-\frac{2p}{x}+1=0$ [proved]

Answer to the question no; 2/a

Given, a = $\frac{\sqrt[3]{m+1}+\sqrt[3]{m-1}}{\sqrt[3]{m+1}-\sqrt[3]{m-1}}$

Or, $\frac{a+1}{a-1}=\frac{\sqrt[3]{m+1}+\sqrt[3]{m-1}+\sqrt[3]{m+1}-\sqrt[3]{m-1}}{\sqrt[3]{m+1}+\sqrt[3]{m-1}-\sqrt[3]{m+1}+\sqrt[3]{m-1}}$ [cmponando-divinando]

Or,$\frac{a+1}{a-1} = \frac{2\sqrt[3]{m+1}}{2\sqrt[3]{m-1}}$

Or, $\frac{a+1}{a-1}$= $\frac{\sqrt[3]{m+1}}{\sqrt[3]{m-1}}$ [answer]

Answer to the question no; 2/b

Prove that $a^3 - 3ma^2 + 3a - m$ =0

$\frac{a+1}{a-1}$= $\frac{\sqrt[3]{m+1}}{\sqrt[3]{m-1}}$ [From-a]

Or,$\frac{(a+1)^3}{(a-1)^3}$ =$\frac{(\sqrt[3]{m+1})^3}{(\sqrt[3]{m-1})^3}$,[cubing both sides]

Or ,$\frac{a^3+3a^2+3a+1}{a^3-3a^2+3a-1}$ = $\frac{m+1}{m-1}$

Or, $\frac{a^3+3a^2+3a+1+a^3-3a^2+3a-1}{a^3+3a^2+3a+1-a^3+3a^2-3a+1}$ = $\frac{m+1+m-1}{m+1-m+1}$ [cmponando-divinando]

Or,$\frac{2a^3+6a}{6a^2+2}$=$\frac{2m}{2}$

Or,$\frac{2[a^3+3a]}{2(3a^2+1)}$ =m

Or,$a^3 + 3a = 3a^2m + m$

Or,a^3-3ma^2+3a-m=0 [proved]

Answer to the question no; 2/c

If $\frac{bz-cy}{a} = \frac{cx-az}{b} = \frac{ay-bx}{c}$ then prove that,$\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$

Let, $\frac{bz-cy}{a} = \frac{cx-az}{b} = \frac{ay-bx}{c}$ =k [constant]

bz-cy=ak……….(i)×a

cx-az=bk………..(ii)×b [multiply equation,i,ii,iii by a,b,c]

ay-bx=ck……….(iii)×c

abz-acy=a^2k……..(iv)

bcx - abz=b^2k……..(v)

acy –bcx =c^2k…….(vi)

0 =k$(a^2+b^2+c^2)$ [adding]

Or,k=0

So, bz-cy=0

Or, bz=cy

Or,$\frac{bz}{bc}=\frac{cy}{bc}$ [dividing by ,bc]

Or,$\frac{z}{c}=\frac{y}{b}$ similarly,$\frac{x}{a}=\frac{y}{b}$ [proved]

Answer to the question no; 3/a

Given, $\frac{1}{p}+\frac{1}{q}=\frac{8}{x}$

Or,$\frac{p+q}{pq}$=$\frac{8}{x}$

Or, x$(p+q)=$ 8pq [cross-multiply]

Or, x = $\frac{8pq}{p+q}$ [answer]

Answer to the question no; 3/b

Find the value of $\frac{x+4p}{x-4p}+\frac{x+4q}{x-4q}$

x = $\frac{8pq}{p+q}$ [from-a]

or,$\frac{x}{4p} = \frac{2q}{p+q}$ [dividing by ,4p]

or,$\frac{x+4p}{x-4p}$ = $\frac{2q+p+q}{q-p}$ [cmponando-divinando]

or, ,$\frac{x+4p}{x-4p}$ = $\frac{3q+p}{q-p}$ ....(i)

Again, x = $\frac{8pq}{p+q}$

or,$\frac{x}{4q} = \frac{2p}{p+q}$ [dividing by ,4q]

or,$\frac{x+4q}{x-4q}$ = $\frac{2p+p+q}{p-q}$ [cmponando-divinando]

or, $\frac{x+4q}{x-4q}$ = $\frac{3p+q}{p-q}$ ....(ii)

Now adding equation (i) and (ii)

$\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ = $\frac{3q+p}{q-p}$ +$\frac{3p+q}{p-q}$

Or, $\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ =$\frac{3q+p}{q-p}$ - $\frac{3p+q}{q-p}$

Or, $\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ =$\frac{3q+p-3p-q}{q-p}$

Or, $\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ =$\frac{2q-2p}{q-p}$

Or, $\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ =$\frac{2(q-p)}{(q-p)}$

Or, $\frac{x+4p}{x-4p} + \frac{x+4q}{x-4q}$ =2 [answer]

<u>Answer to the question no; 3/c</u>

From the stem, $\frac{p^2+q^2}{q^2+r^2}=\frac{(p+q)^2}{(q+r)^2}$

Or. $\frac{p^2+q^2}{(p+q)^2}=\frac{q^2+r^2}{(q+r)^2}$ [alternando]

Or, $\frac{\lfloor p+q\rfloor^2}{p^2+q^2}=\frac{\lfloor q+r\rfloor^2}{q^2+r^2}$ [Invertando]

or $\frac{(p+q)^2-p^2-q^2}{p^2+q^2}=\frac{(q+r)^2-q^2-r^2}{q^2+r^2}$ [divinando]

or, $\frac{2pq}{p^2+q^2}=\frac{2qr}{q^2+r^2}$

or, $\frac{p}{p^2+q^2}=\frac{r}{q^2+r^2}$ [dividing by 2q]

or, p$[q^2+r^r]$ =$r[p^2+q^2]$ [cross-multiply]

or, $pq^2+pr^2=rp^2+rq^2$

or, $pq^2-rq^2=rp^2-pr^2$

or, $q^2(p-r)=pr(p-r)$

or, $q^2=pr$

or , $\frac{q^2}{pq}=\frac{pr}{pq}$

or, $\frac{q}{p}=\frac{r}{q}$

therefore p, q, r are continued proportion [proved]