Answer on Question #83150 – Math – Algebra

Question

Five real numbers r, a, b, c, d are such that

$$\sqrt{r-1}+2\sqrt{a-4}+3\sqrt{b-9}+4\sqrt{c-16}+5\sqrt{d-25}=\frac{a+b+c+d+r}{2}$$

Find the value of (r+a+b+c+d):

a) 55
b) 210
c) not uniquely determined
d) 110

Solution

$$\sqrt{r-1}+2\sqrt{a-4}+3\sqrt{b-9}+4\sqrt{c-16}+5\sqrt{d-25}=\frac{a+b+c+d+r}{2}$$

] $r-1=f^2, f\geq 0$
] $a-4=t^2, t\geq 0$
] $b-9=k^2, k\geq 0$
] $c-16=l^2, l\geq 0$
] $d-25=p^2, p\geq 0$

Then equality can be rewritten as:

$$f+2t+3k+4l+5p=\frac{f^2+1+t^2+4+k^2+9+l^2+16+p^2+25}{2}$$

$$(f^2-2f+1)+(t^4-4t+4)+(k^2-6k+9)+(l^2-8l+16)+(p^2-10p+25)=0$$

$$(f-1)^2+(t-2)^2+(k-3)^2+(l-4)^2+(p-5)^2=0$$

The sum of the squares of numbers is zero if each of the squares is zero, therefore:

$f=1;\ t=2;\ k=3;\ l=4;\ p=5$

In this case:

$r=1+f^2=1+1^2=2$

Similarly:

$a=4+2^2=8;\ b=9+3^2=18;\ c=16+4^2=32;\ d=25+5^2=50$

$a+b+c+d+r=2+8+18+32+50=110$

Answer: Sum is 110 (answer is option d).

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