Bergen County Mathematics League

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Brief Contest Solutions #1 — **2012-2013**

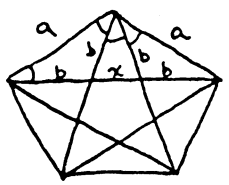
1-1) $n, n+1, n+2, n+3$

$n^2+5n+6 = 10n+n+1$ [or $10(n+1)+n$]

$n^2-6n+5=0$ $\quad n^2-6n-4=0$

$n=1$ or $n=5$ $\quad$ no integer solutions

1, 2, 3, 4 or $\boxed{5,6,7,8}$ $\quad S>20$, so $S=5+6+7+8=\boxed{26}$

1-2) 

$a=b+x \Rightarrow b=a-x$

$\frac{a}{b}=\frac{b}{x}$

$b^2=ax=a^2-2ax+x^2$

$a^2-3ax+x^2=0$

$\left(\frac{x}{a}\right)^2-3\left(\frac{x}{a}\right)+1=0$

$\frac{x}{a}=\frac{3\pm\sqrt{5}}{2}$

$x<a \Rightarrow \frac{x}{a}=\frac{3-\sqrt{5}}{2} \Rightarrow (c,d)=\boxed{(3,5)}$.

1-3) expression $=N=\sqrt{6+N}$, so $N^2=6+N$. Since $N>0$, $N=\boxed{3}$.

1-4) $(x-y)+\sqrt{x-y}-6 = (\sqrt{x-y}+3)(\sqrt{x-y}-2)=0$

$\therefore x-y=4$

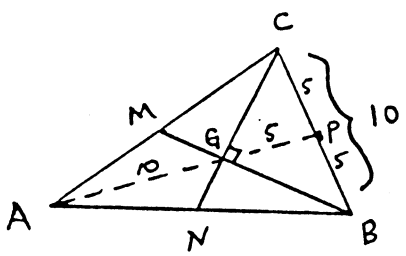
But $x+y=14$ $\Rightarrow (x,y)=\boxed{(9,5)}$

1-5)

	Present Age	Age in x yrs
Peter	y	$y+x$
Janet	$2y$	$2y+x$
Mrs. Ross	$4y$	$4y+x$

$4y+x=2(y+x)$

$\Rightarrow 4y=\boxed{2x}$

1-6) 

$BC=10 \Rightarrow GP=5 \Rightarrow AG=10 \Rightarrow AP=5+10=\boxed{15}$.