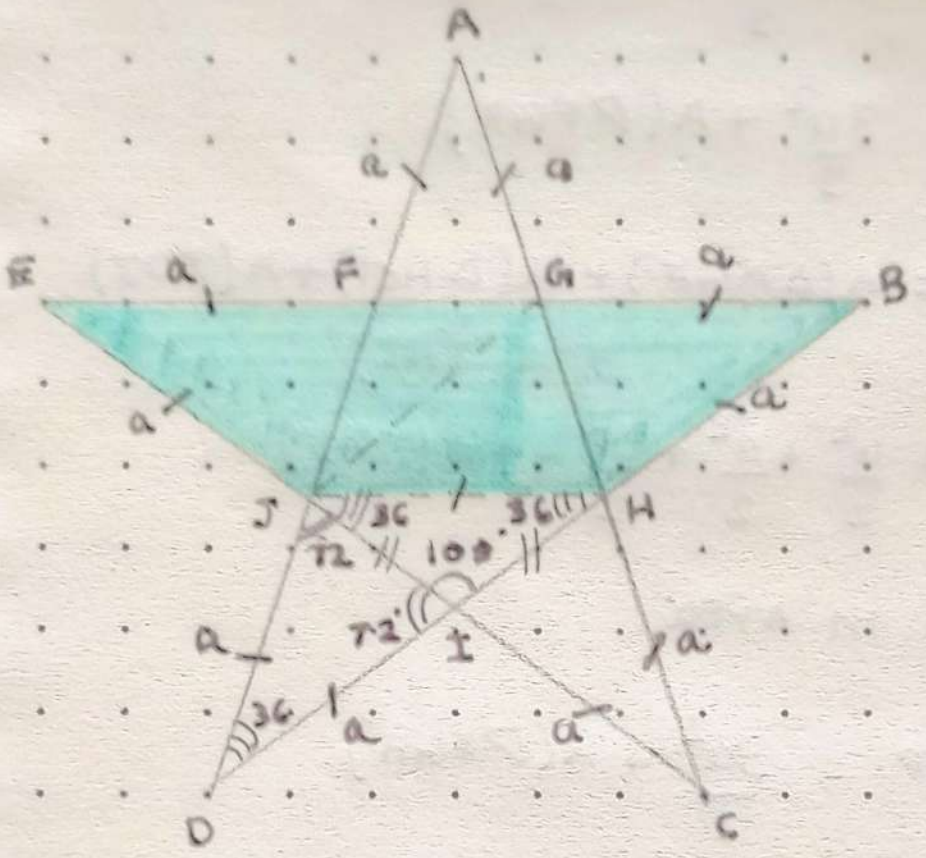
Problem . MCI Challenge Feb 24.

1



$\angle JIH = 108^\circ$ (Internal Angle of Pentagon).

$\therefore \angle JID = 72^\circ$ (Supplementary Angles).

$\because JD = ID$, $\angle DJI = 72^\circ$.

$\therefore \angle JDI = 180 - 72 - 72 = 36^\circ$

$\angle IJH = \angle IHJ = 36$ ($\because IJ = IH$).

$\because \angle IHJ = \angle JDI$, $JH = JD = a$

▱ JGBH is a rhombus with side a

$\therefore A(▱ JGBH) = a^2$.

$\because \Delta BGH = 1/2$ ▱ JGBH, $A(\Delta BGH) = \frac{a^2}{2}$. store 67

$\therefore A(EFJ) = \frac{1}{2} a^2$

$A(\triangledown EBHJ) = A(\square JGBH) + A(\Delta EFJ) + A(\triangledown FGJ)$

$= a^2 + \frac{a^2}{2} + A(\triangledown FGJ)$

Bindu's cake area $= \frac{3a^2}{2} + A(\triangledown FGH)$

Anita's cake area $= A(\Delta AGF) + A(\Delta HCI) + A(IDJ) + A(IHJ)$

$= \frac{a^2}{2} + \frac{a^2}{2} + \frac{a^2}{2} + A(IHJ)$

$\Delta IHJ = \Delta FGH$ in Area..

$\therefore$ Anita's cake area $= \frac{3a^2}{2} + A(\triangledown FGH)$

$\because$ both Anita's and Bindu's contributions are equal, they can split costs in half.

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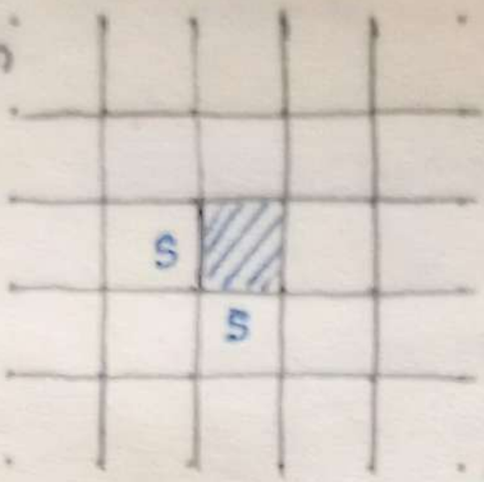
Problem 2

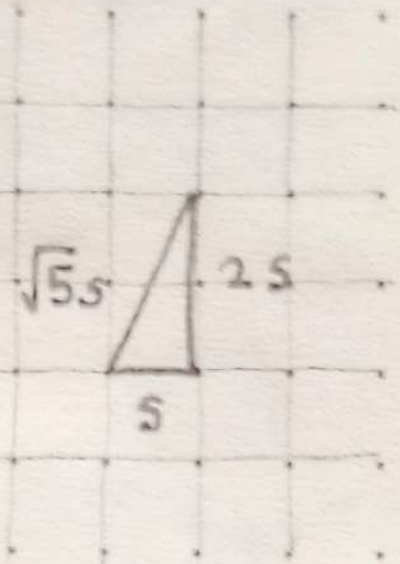


$A = s^2$

$A_N = 5s^2$

$S_N = \sqrt{5}\,s$

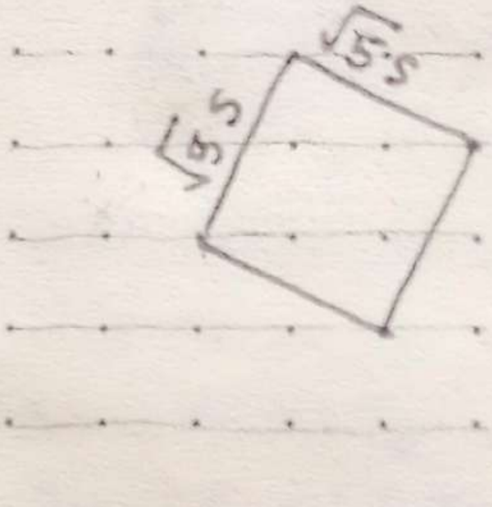
$S_N \leftarrow$



Pythagoras theorem:

$\text{hyp} = \sqrt{s^2 + (2s)^2}$

$= \sqrt{5}\,s$



Area of this square $= 5s^2$