IGP

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1. Consider $\triangle ABC$ with $AB = 13, BC = 15, CA = 14$. If M is the midpoint of AB and P is a point on AC such that $MP \perp AC$, find MP. *(W2b)*

2. Tangents from point C to circle O are extended to A and B such that AB is tangent to O at X. If the perimeter of $\triangle ABC$ is 50 and $[ABC] = 100$, find the area of circle O. *(1.8)*

3. Consider $\triangle ABC$ with $AB = 5, BC = 12, AC = 13$. Angle bisector AD and median AE is drawn such that B, C, D, E are collinear. Find $[ADE]$. *(2.2)*

4. Find $\frac{1}{1\cdot 2} + \frac{2}{2\cdot 4} + \frac{3}{4\cdot 7} + \frac{4}{7\cdot 11} + \frac{5}{11\cdot 16}$. *(3.1)*

5. Find the number of subsets of $\{1, 2, 3, 4, 5, 6, 7, 8\}$ that are subsets of neither $\{1, 2, 3, 4, 5\}$ nor $\{4, 5, 6, 7, 8\}$. *(4.3)*

6. How many 4 digit falling numbers are there? (A falling number is a number whose last digit is strictly smaller than its second-to last digit, and so on. Ex. 4321) *(4.6)*