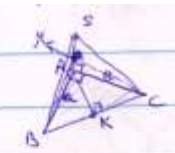
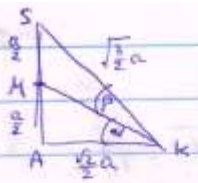
3.72 / 6 (a)





$AK = \frac{1}{2}AC = \frac{1}{2}\sqrt{AB^2+AC^2} = \frac{\sqrt{2}}{2}a$

$\tan\alpha = \frac{\frac{a}{2}}{\frac{\sqrt{2}}{2}a} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$SK = \sqrt{SA^2+AK^2} = \sqrt{a^2+\frac{a^2}{2}} = \sqrt{\frac{3}{2}}a$

$MK = \sqrt{MA^2+AK^2} = \sqrt{\frac{a^2}{4}+\frac{a^2}{2}} = \frac{\sqrt{3}}{2}a$

$\triangle SMK$: $SM^2 = MK^2 + SK^2 - 2MK\cdot SK\cdot\cos\beta$

$\frac{a^2}{4} = \frac{3a^2}{4} + \frac{3a^2}{2} - 2\cdot\frac{\sqrt{3}}{2}a\cdot\sqrt{\frac{3}{2}}a\cdot\cos\beta \rightarrow \cos\beta = \frac{\frac{4}{2}}{\frac{3}{\sqrt{2}}} = \frac{\sqrt{2}}{6} = \frac{2\sqrt{2}}{3}$

$1+\tan^2\beta = \frac{1}{\cos^2\beta} = \frac{9}{8} \rightarrow \tan^2\beta = \frac{1}{8} \Rightarrow \tan\beta = \sqrt{\frac{1}{8}} = \frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4}$

(?) $V_{SABC} = V_{SABC} - V_{AABC} = \frac{1}{3}S_{ABC}(SA-AA) = \frac{1}{3}\cdot\frac{a^2}{2}\left(a-\frac{a}{2}\right) = \frac{a^3}{12}$

$P_{ABC} = S_{AABC} + S_{SBC} + S_{SAB} + S_{SAC} = \frac{\sqrt{3}a}{2}\cdot\frac{\sqrt{2}a}{2} + 2\left(S_{SAB} - S_{AAB}\right) =$

$= \frac{\sqrt{6}a^2}{4} + \frac{\sqrt{3}a^2}{2} + 2\left(\frac{a^2}{2} - \frac{a\cdot a}{2}\right) = \frac{\sqrt{6}a^2}{4} + \frac{\sqrt{3}a^2}{2} + 2\left(\frac{a^2}{2} - \frac{a^2}{4}\right) = \frac{\sqrt{6}+2\sqrt{3}}{4}a^2 + \frac{a^2}{2}$