۱) الف)

$(\sin 120 + \sin 30)(\cos^2 60 - \cos 60) =$

$(\frac{\sqrt{3}}{2} + \frac{1}{2})(\frac{1}{2} - \frac{1}{2}) = (\frac{\sqrt{3}}{2})^2 - (\frac{1}{2})^2 = \frac{3}{4} - \frac{1}{4} = \boxed{\frac{1}{2}}$

ب)

$\tan 210 = \frac{\sqrt{3}}{3} = \tan^2 210$ [redacted] $(\frac{\sqrt{3}}{3})^2 = \frac{3}{9} = \frac{1}{3} \rightarrow 1 + 3 \times \frac{1}{3} = 2$

$\frac{\ln e^{\tan^2 210}}{4\cos^2 210 + 2\cos^2 210} = \frac{2}{4} = \boxed{\frac{1}{2}}$

$2(2\cos^2 210 + \cos^2 210) =$

$\cos 210 = \frac{\sqrt{3}}{2} = \cos^2 30 = (\frac{\sqrt{3}}{2})^2 = \frac{3}{4}$

$\cos^2 210 = \frac{-\sqrt{2}}{2} = \cos^2 225 = \frac{1}{2}$

$\rightarrow 2(\underbrace{3 \times \frac{3}{4}}_{\frac{9}{4}} + \frac{1}{2}) = 4$

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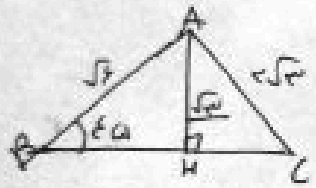
۲) الف)




$\rightarrow (2\sqrt{3})^2 = (\sqrt{6})^2 + x^2$

$12 \quad 3$

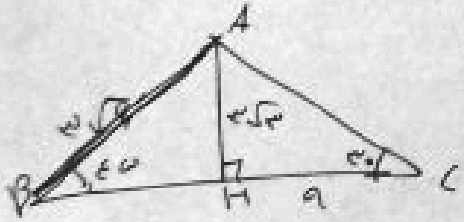
$\hookrightarrow x^2 = 9 \rightarrow x = 3$ (ق ق ق)

$\boxed{HC = 3}$

$\sin = \frac{\text{مقابل}}{\text{وتر}}$ $\sin 60 = \frac{\sqrt{3}}{2} \rightarrow \frac{\sqrt{2}}{2} = \frac{x}{\sqrt{6}} \rightarrow x = \frac{\sqrt{12}\sqrt{6}}{4} = \sqrt{3}$

$\sqrt{12} = 2\sqrt{3}$

ب)




$\sin B^\circ = \frac{2\sqrt{3}}{4\sqrt{6}} \rightarrow \frac{\sqrt{2}}{2\sqrt{6}} = \frac{\sqrt{2}}{4\sqrt{2}} = \frac{\sqrt{2}}{4} \rightarrow \boxed{B = 60^\circ}$

$\tan = \frac{\sin}{\cos} = \frac{\text{مقابل}}{\text{مجاور}}$ $\tan 30 = \frac{\sqrt{3}}{3} = \frac{x}{9} \rightarrow x = \frac{9\sqrt{3}}{3} = 3\sqrt{3}$

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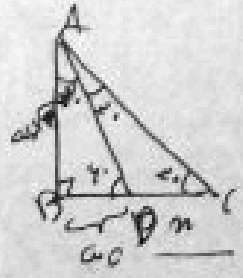
۳) الف)

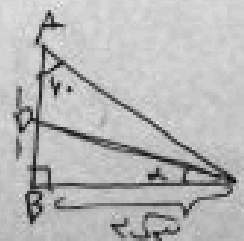



$\tan 30 = \frac{\sqrt{3}}{3} = \frac{\text{مقابل}}{\text{مجاور}} = \frac{BD}{100\sqrt{3}} \rightarrow BD = 100$

$\tan 45 = 1 = \frac{\text{مقابل}}{\text{مجاور}} = \frac{BC}{100\sqrt{2}} \rightarrow BC = 100$

$\boxed{BC = 100}$

ب)

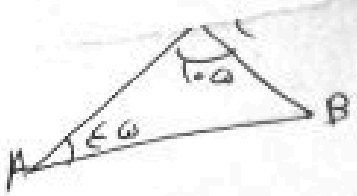



$\tan 30 = \frac{\text{مقابل}}{\text{مجاور}} = \frac{BC}{2} = \frac{\sqrt{3}}{1} \rightarrow BC = 2\sqrt{3}$

$(1)^2 + (2\sqrt{3})^2 = (DC)^2$

$\hookrightarrow DC = \sqrt{13}$

$\sin \alpha = \frac{\text{مقابل}}{\text{وتر}} = \boxed{\frac{\sqrt{13}}{1}}$




$\frac{AB}{AC} = ?$ $\boxed{\frac{\sqrt{6}+\sqrt{2}}{4}}$ (۴

$\sin 105 = \sin(60+45) = \sin 60\cos 45 + \cos 60 \sin 45 = \frac{\sqrt{6}+\sqrt{2}}{4}$

$\frac{AB}{\sin C} = \frac{AC}{\sin B} \rightarrow \sin C \times AC = \sin B \times AB \rightarrow \frac{\sin C}{\sin B} = \frac{AB}{AC} = \frac{\sin 45}{\sin 30} = \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}}$

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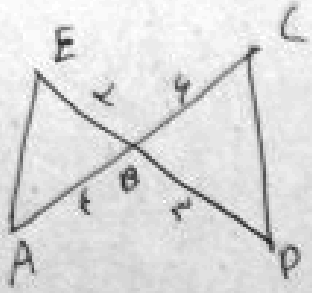


$\frac{S_{ABE}}{S_{BCD}} = ?$ $\boxed{\frac{4}{9}}$ (۵

$\frac{\frac{1}{2} \times 4 \times 2 \times \sin\theta}{\frac{1}{2} \times 3 \times 4 \times \sin\theta} = \frac{8}{12} = \frac{2}{3}$

$S_{\triangle} = \frac{1}{2} \times BC \times BD \times \sin B$

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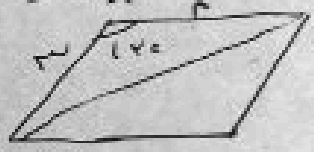
$\frac{1}{2} \times 2 \times 3 \times \frac{\sqrt{3}}{2} = \boxed{3\sqrt{3}}$

۲) $\frac{1}{2} \times 4 \times 3 \times \sin 120 = \frac{12\sqrt{3}}{2} = \boxed{6\sqrt{3}}$ (۶ (الف




$S = \frac{1}{2} \times AB \times B(C \times \sin B)$

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$\tan\theta = \frac{\text{مقابل}}{\text{مجاور}} = \frac{2}{4} = \frac{1}{2}$ (۷

$\cos\theta = \boxed{\frac{2}{\sqrt{5}}}$


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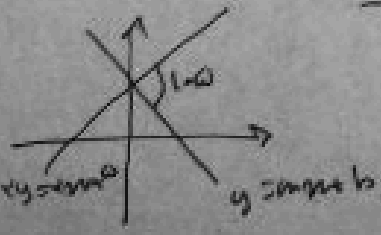
(۸ ؟

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$\sin(\frac{7\pi}{2} + x) = \cos x$

$\cos(\frac{10\pi}{2} - x) = -\sin x$

$\cos(4\pi + x) = \cos x$

$\sin(4\pi - x) = \sin(-x) = -\sin x$

$\frac{\cos - \sin x}{\sin x - \cos x} = \frac{\cos x - \sin x}{-(\cos x - \sin x)} = -1$ (۱۰

$f(x) = -\cos x + \cos x + \cot x$ (۹

$f(x) = \cot x$

$f(\frac{\pi}{6}) = \cot(\omega_0) \Rightarrow \boxed{-\sqrt{3}}$

$120$