1.

$$\frac{sen\ 30° + \cos 60°}{\tan 45°} = \frac{\frac{1}{2} + \frac{1}{2}}{1} = \frac{1}{1} = 1$$

2.

$$\frac{(sen\ 45)^{-1} + \tan 60°}{\cos 30°} = \frac{\left(\frac{\sqrt{2}}{2}\right)^{-1} + \sqrt{3}}{\frac{\sqrt{3}}{2}} = \frac{\frac{1}{\frac{\sqrt{2}}{2}} + \sqrt{3}}{\frac{\sqrt{3}}{2}} = \frac{\frac{1}{\frac{1}{\sqrt{2}}} + \sqrt{3}}{\frac{\sqrt{3}}{2}} = \frac{\frac{2}{\sqrt{2}} + \frac{\sqrt{3}}{1}}{\frac{\sqrt{3}}{2}} = \frac{\frac{2 + \sqrt{6}}{\sqrt{2}}}{\frac{\sqrt{3}}{2}} = \frac{4 + 2\sqrt{6}}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{4\sqrt{6} + 2 \times 6}{6} = \frac{4\sqrt{6} + 12}{6} = \frac{2\sqrt{6} + 6}{3}$$

3.

$$2 \tan 60° \times \tan 30° = (2) \times (\sqrt{3}) \times \left(\frac{\sqrt{3}}{3}\right) = \left(\frac{2}{1}\right) \times \left(\frac{\sqrt{3}}{1}\right) \times \left(\frac{\sqrt{3}}{3}\right) = \frac{2\sqrt{9}}{3} = \frac{2 \times 3}{3} = \frac{6}{3} = 2$$

4.

$$\sqrt{2} \cos 60° \times \cot 45° = (\sqrt{2}) \times \left(\frac{1}{2}\right) \times (1) = \frac{\sqrt{2}}{1} \times \frac{1}{2} \times \frac{1}{1} = \frac{\sqrt{2}}{2}$$

5.

$$\frac{3 \tan 30°}{sen\ 60°} = \frac{(3) \times \left(\frac{\sqrt{3}}{3}\right)}{\frac{\sqrt{3}}{2}} = \frac{\frac{3}{1} \times \frac{\sqrt{3}}{3}}{\frac{\sqrt{3}}{2}} = \frac{\frac{3\sqrt{3}}{3}}{\frac{\sqrt{3}}{2}} = \frac{6\sqrt{3}}{3\sqrt{3}} = 2$$

6.

$$5\ sen\ 30° - 3\sqrt{2}\ sen\ 45° + \frac{1}{4} \tan 45° = \left(\frac{5}{1}\right) \times \left(\frac{1}{2}\right) - \left(\frac{3\sqrt{2}}{1}\right) \times \left(\frac{\sqrt{2}}{2}\right) + \left(\frac{1}{4}\right) \times \left(\frac{1}{1}\right) = \frac{5}{2} - \frac{3\sqrt{4}}{2} + \frac{1}{4} = \frac{5}{2} - \frac{3 \times 2}{2} + \frac{1}{4} = \frac{5}{2} - \frac{6}{2} + \frac{1}{4} = \frac{10 - 12 + 1}{4}$$

$$= -\frac{1}{4}$$

7.

$$(\cos 30° - \cos 45°)(\cos 30° + \cos 45°) = \left(\frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}\right) = \frac{\sqrt{9}}{4} + \frac{\sqrt{6}}{4} - \frac{\sqrt{6}}{4} - \frac{\sqrt{4}}{4} = \frac{3}{4} - \frac{2}{4} = \frac{1}{4}$$

8.

$$\frac{\cos 45° + sen\ 45°}{\csc 45°} = \frac{\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}}{\sqrt{2}} = \frac{\frac{2\sqrt{2}}{2}}{\frac{\sqrt{2}}{1}} = \frac{2\sqrt{2}}{2\sqrt{2}} = 1$$

9.

$$\frac{\cos 30°}{sen\ 60° + \cos 45°} = \frac{\frac{\sqrt{3}}{2}}{\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}} = \frac{\frac{\sqrt{3}}{2}}{\frac{2\sqrt{3} + 2\sqrt{2}}{4}} = \frac{4\sqrt{3}}{4\sqrt{3} + 4\sqrt{2}} = \left(\frac{\sqrt{3}}{\sqrt{3} + \sqrt{2}}\right)\left(\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} - \sqrt{2}}\right) = \frac{\sqrt{9} - \sqrt{6}}{\sqrt{9} - \sqrt{4}} = \frac{3 - \sqrt{6}}{3 - 2} = 3 - \sqrt{6}$$

10.

$$\frac{2\ sen\ 60°}{\cot 30° - 4\ sen\ 45°} = \frac{\left(\frac{2}{1}\right)\left(\frac{\sqrt{3}}{2}\right)}{\left(\frac{\sqrt{3}}{1}\right) - \left(\frac{4}{1}\right)\left(\frac{\sqrt{2}}{2}\right)} = \frac{\frac{2\sqrt{3}}{2}}{\left(\frac{\sqrt{3}}{1}\right) - \left(\frac{4\sqrt{2}}{2}\right)} = \frac{\frac{2\sqrt{3}}{2}}{\frac{2\sqrt{3} - 4\sqrt{2}}{2}} = \left(\frac{2\sqrt{3}}{2\sqrt{3} - 4\sqrt{2}}\right)\left(\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}\right) = \frac{2\sqrt{9} + 2\sqrt{6}}{2 \times 3 - 4 \times 2} = \frac{2 \times 3 + 2\sqrt{6}}{6 - 8}$$

$$= \frac{6 + 2\sqrt{6}}{-2} = \frac{3 + \sqrt{6}}{-1} = -3 - \sqrt{6}$$

1.

$$sen\ 30° \times \cos 60° + \cos 30° \times sen\ 60° = \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) + \left(\frac{\sqrt{3}}{2}\right) \times \left(\frac{\sqrt{3}}{2}\right) = \frac{1}{4} + \frac{\sqrt{9}}{4} = \frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$$

2.

$$\cos 30° \times \cos 60° - sen\,30° \times sen\,60° = \left(\frac{\sqrt{3}}{2}\right) \times \left(\frac{1}{2}\right) - \left(\frac{1}{2}\right) \times \left(\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$$

3.

$$\frac{\tan 60° - \tan 30°}{1 + \tan 60° \times \tan 30°} = \frac{\frac{\sqrt{3}}{1} - \frac{\sqrt{3}}{3}}{1 + \left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{3}}{3}\right)} = \frac{\frac{3\sqrt{3} - \sqrt{3}}{3}}{\frac{1}{1} + \frac{\sqrt{9}}{3}} = \frac{\frac{2\sqrt{3}}{3}}{\frac{3+3}{3}} = \frac{2\sqrt{3}}{6} = \frac{\sqrt{3}}{3}$$

4.

$$\frac{1}{sen^2\,30} + \frac{1}{cos^2\,60} = \frac{1}{\left(\frac{1}{2}\right)^2} + \frac{1}{\left(\frac{1}{2}\right)^2} = \frac{\frac{1}{1}}{\frac{1}{4}} + \frac{\frac{1}{1}}{\frac{1}{4}} = 4 + 4 = 8$$

5.

$$\frac{\cos 30°}{\tan 45°} + \frac{sen\,30°}{\cos 60°} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{1}} + \frac{\frac{1}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} + \frac{2}{2} = \frac{2\sqrt{3} + 4}{4} = \frac{\sqrt{3} + 2}{2}$$

6.

$$\frac{1}{\cos 30°} \times \frac{1}{\tan 60°} - \frac{1}{sen\,45°} = \frac{\frac{1}{1}}{\frac{\sqrt{3}}{2}} \times \frac{1}{\sqrt{3}} - \frac{\frac{1}{1}}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{3}} \times \frac{1}{\sqrt{3}} - \frac{2}{\sqrt{2}} = \frac{2}{\sqrt{9}} - \frac{2}{\sqrt{2}} = \frac{2}{3} - \frac{2}{\sqrt{2}} = \frac{2\sqrt{2} - 6}{3\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{4} - 6\sqrt{2}}{3\sqrt{4}} = \frac{2 \times 2 - 6\sqrt{2}}{3 \times 2}$$

$$= \frac{4 - 6\sqrt{2}}{6} = \frac{2 - 3\sqrt{2}}{3}$$

7.

$$\frac{sen\,60° - cos^2\,45°}{\cos 60°} = \frac{\frac{\sqrt{3}}{2} - \left(\frac{\sqrt{2}}{2}\right)^2}{\frac{1}{2}} = \frac{\frac{\sqrt{3}}{2} - \frac{2}{4}}{\frac{1}{2}} = \frac{\frac{4\sqrt{3} - 4}{8}}{\frac{1}{2}} = \frac{8\sqrt{3} - 8}{8} = \sqrt{3} - 1$$

8.

$$sen\,30° \times \cos 45° - \tan 60° = \left(\frac{1}{2}\right) \times \left(\frac{\sqrt{2}}{2}\right) - \frac{\sqrt{3}}{1} = \frac{\sqrt{2}}{4} - \frac{\sqrt{3}}{1} = \frac{\sqrt{2} - 4\sqrt{3}}{4}$$

9.

$$(sen\,45°)^{-1} \times sen\,60° - (\cot 30°)^{-1} = \left(\frac{\sqrt{2}}{2}\right)^{-1} \times \frac{\sqrt{3}}{2} - (\sqrt{3})^{-1} = \frac{1}{\frac{\sqrt{2}}{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{3}} = \frac{\frac{1}{1}}{\frac{\sqrt{2}}{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{3}} = \frac{2\sqrt{3}}{2\sqrt{2}} - \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{2}} - \frac{1}{\sqrt{3}}$$

$$= \frac{\sqrt{9} - \sqrt{2}}{\sqrt{6}} = \frac{3 - \sqrt{2}}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{3\sqrt{6} - \sqrt{12}}{\sqrt{36}} = \frac{3\sqrt{6} - 2\sqrt{3}}{6}$$

10.

$$2(sen\,30° - sen\,45°)^2 - 1 = 2\left(\frac{1}{2} + \frac{\sqrt{2}}{2}\right)^2 - 1 = 2\left(\frac{1}{4} + \frac{\sqrt{2}}{2} + \frac{2}{4}\right) - 1 = 2\left(\frac{3}{4} + \frac{\sqrt{2}}{2}\right) - 1 = \frac{2}{1} \times \left(\frac{3}{4} + \frac{\sqrt{2}}{2}\right) - 1 = \frac{6}{4} + \frac{2\sqrt{2}}{2} - 1 = \frac{3}{2} + \frac{\sqrt{2}}{1} - \frac{1}{1}$$

$$= \frac{3 + 2\sqrt{2} - 2}{2} = \frac{1 + 2\sqrt{2}}{2}$$

③

1.

$$\frac{tan^2\,30° + sen^2\,30°}{(sen\,45°)^{-2} \div (sen\,30°)^{-2}} = \frac{\left(\frac{\sqrt{3}}{3}\right)^2 + \left(\frac{1}{2}\right)^2}{\frac{1}{\left(\frac{\sqrt{2}}{2}\right)^2} \div \frac{1}{\left(\frac{1}{2}\right)^2}} = \frac{\frac{3}{9} + \frac{1}{4}}{\frac{1}{\frac{1}{2}} \div \frac{1}{\frac{1}{4}}} = \frac{\frac{12 + 9}{36}}{\frac{1}{\frac{4}{2}} \div \frac{4}{1}} = \frac{\frac{21}{36}}{2 \div 4} = \frac{\frac{21}{36}}{\frac{2}{4}} = \frac{84}{72} = \frac{7}{6}$$

2.

$$\frac{sen\,60° \times (\cos 45°)^{-1} - \tan 30°}{\tan 45°} = \frac{\frac{\sqrt{3}}{2} \times \frac{\frac{1}{1}}{\frac{\sqrt{2}}{2}} - \frac{\sqrt{3}}{3}}{1} = \frac{\sqrt{3}}{2} \times \frac{2}{\sqrt{2}} - \frac{\sqrt{3}}{3} = \frac{2\sqrt{3}}{2\sqrt{2}} - \frac{\sqrt{3}}{3} = \frac{\sqrt{3}}{\sqrt{2}} - \frac{\sqrt{3}}{3} = \frac{3\sqrt{3} - \sqrt{6}}{3\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{6} - \sqrt{12}}{3\sqrt{4}} = \frac{3\sqrt{6} - 2\sqrt{3}}{3 \times 2}$$

$$= \frac{3\sqrt{6} - 2\sqrt{3}}{6}$$

3.

$$2\,sen30° - cos\,30° \times (cos\,45°)^{-1} = \left(\frac{2}{1}\right) \times \left(\frac{1}{2}\right) - \frac{\sqrt{3}}{2} \times \frac{\frac{1}{1}}{\frac{\sqrt{2}}{2}} = \frac{2}{2} - \frac{\sqrt{3}}{2} \times \frac{2}{\sqrt{2}} = \frac{1}{1} - \frac{2\sqrt{3}}{2\sqrt{2}} = \frac{1}{1} - \frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{4}-\sqrt{6}}{\sqrt{4}} = \frac{2-\sqrt{6}}{2}$$

4.

$$tan\,60° - (sen\,60° \times cos\,45°)^{-1} = \frac{\sqrt{3}}{1} - \left(\frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2}\right)^{-1} = \frac{\sqrt{3}}{1} - \left(\frac{\sqrt{6}}{4}\right)^{-1} = \frac{\sqrt{3}}{1} - \frac{1}{\frac{\sqrt{6}}{4}} = \frac{\sqrt{3}}{1} - \frac{\frac{1}{1}}{\frac{\sqrt{6}}{4}} = \frac{\sqrt{3}}{1} - \frac{4}{\sqrt{6}} = \frac{\sqrt{18}-4}{\sqrt{6}} = \frac{3\sqrt{2}-4}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}}$$

$$= \frac{3\sqrt{12}-4\sqrt{6}}{\sqrt{36}} = \frac{3 \times 2\sqrt{3}-4\sqrt{6}}{6} = \frac{6\sqrt{3}-4\sqrt{6}}{6} = \frac{3\sqrt{3}-2\sqrt{6}}{3}$$

5.

$$\frac{sec^3 45° - cot^2 30°}{(cot\,60°)^{-2}} = \frac{\left(\sqrt{2}\right)^3 - \left(\sqrt{3}\right)^2}{\frac{1}{\left(\frac{\sqrt{3}}{3}\right)^2}} = \frac{\sqrt{8}-3}{\frac{1}{\frac{3}{9}}} = \frac{2\sqrt{2}-3}{\frac{9}{3}} = \frac{2\sqrt{2}-3}{3}$$

6.

$$\frac{2\,sen\,30° \times cos\,30°}{csc\,60° + sec\,30°} = \frac{\left(\frac{2}{1}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{\sqrt{3}}{2}\right)}{\frac{2\sqrt{3}}{3} + \frac{2\sqrt{3}}{3}} = \frac{\frac{2\sqrt{3}}{4}}{\frac{6\sqrt{3}+6\sqrt{3}}{9}} = \frac{18\sqrt{3}}{24\sqrt{3}+24\sqrt{3}} = \frac{18\sqrt{3}}{48\sqrt{3}} = \frac{18}{48} = \frac{3}{8}$$

7.

$$\frac{sen^2 30° + cos^2 30 + 1}{sec\,45° \times tan\,30°} = \frac{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + 1}{\left(\frac{\sqrt{2}}{1}\right) \times \left(\frac{\sqrt{3}}{3}\right)} = \frac{\frac{1}{4}+\frac{3}{4}+1}{\frac{\sqrt{6}}{3}} = \frac{\frac{4}{4}+1}{\frac{\sqrt{6}}{3}} = \frac{1+1}{\frac{\sqrt{6}}{3}} = \frac{2}{\frac{\sqrt{6}}{3}} = \frac{\frac{2}{1}}{\frac{\sqrt{6}}{3}} = \frac{6}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{6\sqrt{6}}{\sqrt{36}} = \frac{6\sqrt{6}}{6} = \sqrt{6}$$

8.

$$\frac{\sqrt{3}\,sen\,45° + \sqrt{2}\,cos\,30°}{tan\,60°} = \frac{\left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{2}}{1}\right)\left(\frac{\sqrt{3}}{2}\right)}{\frac{\sqrt{3}}{1}} = \frac{\frac{\sqrt{6}}{2}+\frac{\sqrt{6}}{2}}{\frac{\sqrt{3}}{1}} = \frac{\frac{2\sqrt{6}+2\sqrt{6}}{4}}{\frac{\sqrt{3}}{1}} = \frac{2\sqrt{6}+2\sqrt{6}}{4\sqrt{3}} = \frac{4\sqrt{6}}{4\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{18}}{4\sqrt{9}} = \frac{4 \times 3\sqrt{2}}{4 \times 3} = \frac{12\sqrt{2}}{12}$$

$$= \sqrt{2}$$

9.

$$\frac{tan\,60° - tan\,30°}{tan\,60° \times tan\,30°} = \frac{\frac{\sqrt{3}}{1} - \frac{\sqrt{3}}{3}}{\left(\frac{\sqrt{3}}{1}\right) \times \left(\frac{\sqrt{3}}{3}\right)} = \frac{\frac{3\sqrt{3}-\sqrt{3}}{3}}{\frac{\sqrt{9}}{3}} = \frac{\frac{3\sqrt{3}-\sqrt{3}}{3}}{\frac{3}{3}} = \frac{9\sqrt{3}-3\sqrt{3}}{9} = \frac{3\sqrt{3}-\sqrt{3}}{3} = \frac{2\sqrt{3}}{3}$$

10.

$$\frac{cot^3 45° + sec^2 30° \times csc^2 60°}{(cot\,60°)^{-1}} = \frac{(1)^3 + \left(\frac{2\sqrt{3}}{3}\right)^2 \times \left(\frac{2\sqrt{3}}{3}\right)^2}{\frac{1}{\frac{\sqrt{3}}{3}}} = \frac{1 + \frac{4 \times 3}{9} \times \frac{4 \times 3}{9}}{\frac{1}{\frac{\sqrt{3}}{3}}} = \frac{1 + \frac{12}{9} \times \frac{12}{9}}{\frac{3}{\sqrt{3}}} = \frac{1 + \frac{4}{3} \times \frac{4}{3}}{\frac{3}{\sqrt{3}}} = \frac{1 + \frac{16}{9}}{\frac{3}{\sqrt{3}}} = \frac{\frac{9+16}{9}}{\frac{3}{\sqrt{3}}} = \frac{\frac{25}{9}}{\frac{3}{\sqrt{3}}}$$

$$= \frac{25\sqrt{3}}{27}$$