An operator $\hat{A}$ representing an observable A has two normalised eigenstates, ψ_1 And ψ_2 with eigenvalues a_1 and a_2. Operator $\hat{B}$ representing an observable B has two normalised eigenstates, ϕ_1 and ϕ_2 with eigenvalues b_1 and b_2. The eigenstates are related by

$$\psi_1 = (3\phi_1 + 4\phi_2)/5 \quad \psi_2 = (4\phi_1 - 3\phi_2)/5$$

(a) Observable A is measured, and the eigenvalue a_1 measured. What is the state of the system immediately after the measurement?

(b) if B is now measured, what are the possible results and their probabilities

(c) Immediately after the measurement of B, A is measured again. What is the probability of getting a_1?

(d) Suppose the measurement of B had not taken place and A is immediately measured again. What is the probability of getting a_1?

(e) What if the measurement of B had taken place but you did not know this fact. What is the probability of getting a_1 if A is immediately measured again?