For these questions, use the simulation "Energy eigenfunctions of the two-dimensional quantum oscillator" (2D Quantum Harmonic Oscillator) in the QuVis HTML5 collection.

1) Have a play with the simulation for a few minutes, getting to understand the controls and displays. Note down three things about the controls and displayed quantities that you have found out.

2a) How can you determine the quantum numbers n_x and n_y from the probability density graph?

b) How can you determine the quantum numbers n_x and n_y from the energy eigenfunction graph?

3) Can you find different combinations of quantum numbers that have the same total energy (so-called degenerate states)? If so, give an example of at least two sets of quantum numbers that describe a degenerate state.

4) One speaks of two-fold, three-fold, four-fold, etc. degeneracy, depending on the number of different possible combinations giving the same total energy. Can you find examples of a two-fold degenerate state, a three-fold degenerate state and a four-fold degenerate state?

5) Which of the Challenges did you find most difficult and why? Explain how you solved this challenge. If none of the Challenges were difficult, choose the one you found most interesting and explain how you solved it.