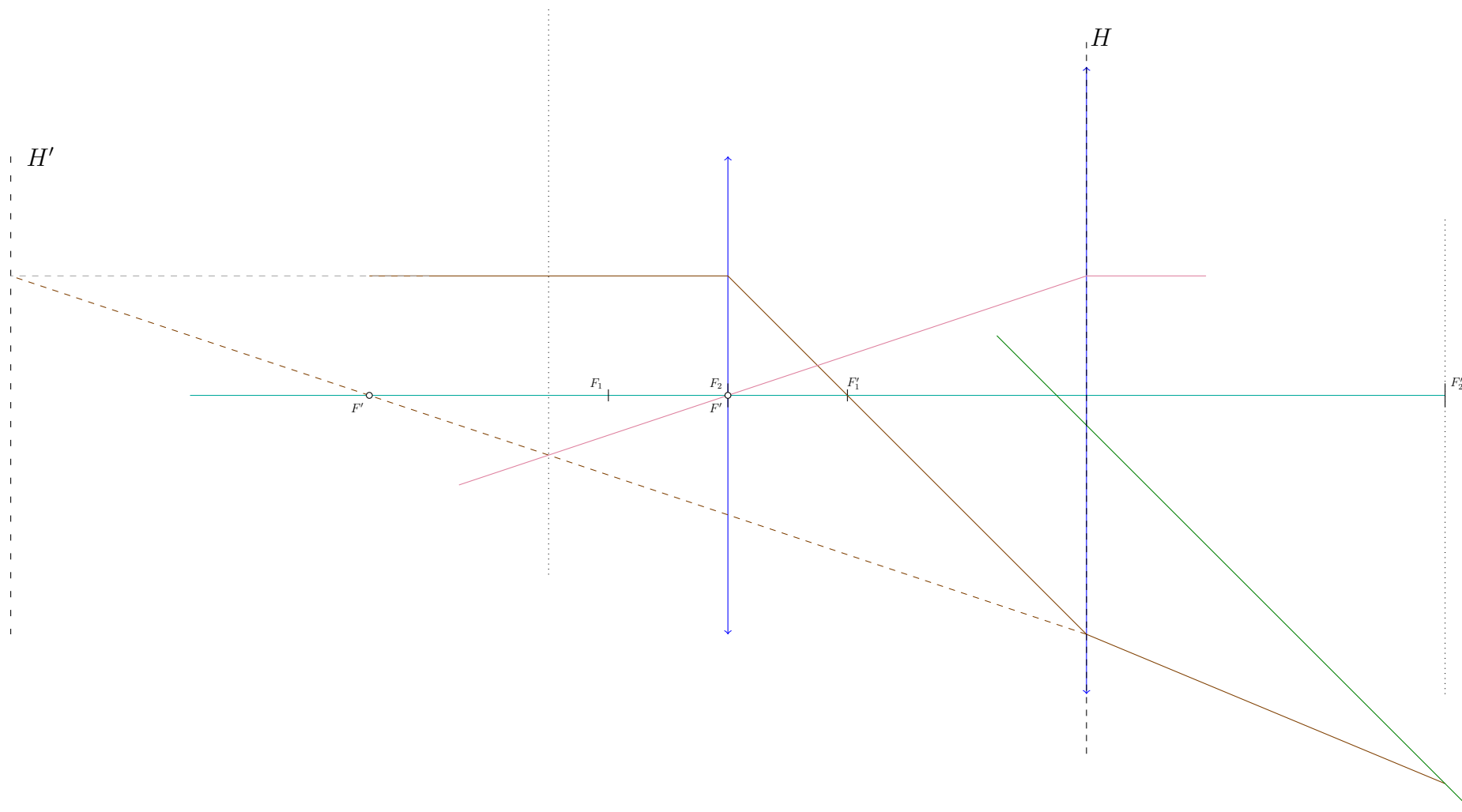


The diagram illustrates the ray optics of a thick lens system. A horizontal cyan line represents the optical axis. Two vertical blue lines with arrows at both ends represent the principal planes, labeled H and H' . A green line represents the front surface of the lens, and a brown line represents the back surface. A dashed brown line connects the centers of curvature of these two surfaces. Two vertical dotted lines represent the planes of the optical centers, O and O' . Points F and F' are marked on the optical axis to the left of O and O' respectively, representing the front and back focal points. Points F_1 and F_2 are marked on the optical axis between the principal planes, representing the front and back focal points of the thin-lens approximation. Points F'_1 and F'_2 are marked on the optical axis to the right of O' , representing the front and back focal points of the thin-lens approximation. A red line and a pink line represent rays passing through the system, with their paths shown as solid lines between the surfaces and dashed lines outside. A horizontal dashed grey line indicates the height of the rays at the principal planes.

2.



3.

