PROBLEMS 3

In some extensions to the Standard Model (e.g. ones with supersymmetry), there exists a charged Higgs boson, $h^{\pm}$, and there is a new $ZW^{+}h^{-}$ vertex which has the Feynman rule

$$i\lambda M_Z g_{\mu\nu}$$

where M_Z is the mass of the Z boson, λ is a dimensionless coupling constant and the indices μ and ν refer to the polarisations of the vector bosons.

A future linear collider might be able to produce the new particle via the reaction $e^{+}e^{-} \to W^{+}h^{-}$. Find the total cross-section for this reaction as a function of centre-of-mass energy. You can neglect the electron mass but not the mass of the bosons. You will also need to look up the Feynman rule for the $e^{+}e^{-}Z$ vertex. Assume that the only new vertex is that given above.