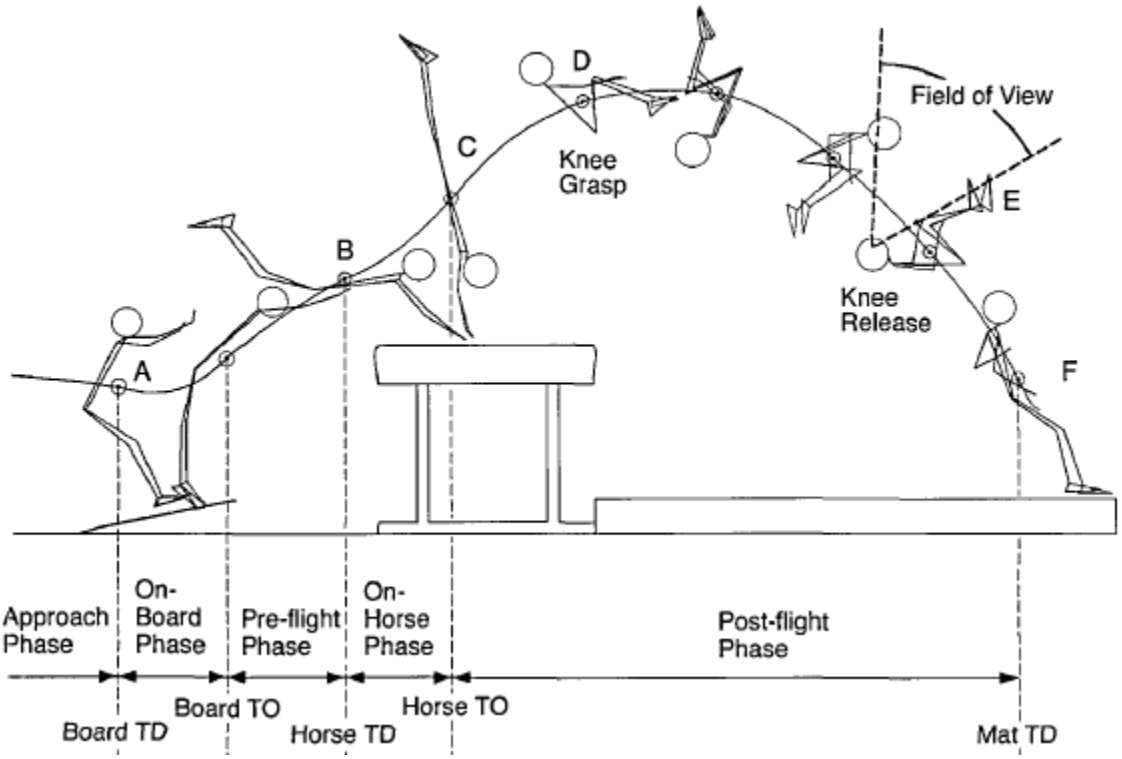

The figure above is a schematic of a gymnast performing a "Roche" vault. The figure is taken from the research paper "Techniques Used in High-Scoring and Low-Scoring 'Roche' Vaults Performed by Elite Male Gymnasts" by Y. Takei, J. H. Dunn and E. Blucker (*Sports Biomechanics* **2** (2) 141 (2003)). In that paper, the authors averaged the parameters of the 16 highest-scoring and 16 lowest-scoring Roche vaults performed in competition by male gymnasts during the 2000 Olympic games. As shown in the figure, a gymnastic vault consists of two separate phases of ballistic flight. The gymnast first leaps toward the vaulting horse with the assistance of a springboard. This leap is labeled the Pre-flight phase in the figure. Then, after pushing off of the horse (the On-Horse phase), the gymnast enters the Post-flight phase. In this problem, we will examine the Pre-flight and Post-flight trajectories found and use them to gain information about the forces involved in a gymnastic vault.

a.) Using the mean parameters of the Pre-flight phase and Post-flight phase for the 16 best vaults given in the table below, determine the net impulse delivered to the gymnast during their contact with the horse, assuming that the gymnast has a mass of 70 kg.

	Initial Height	**Final Height**	**Horizontal Displacement**	**Elapsed Time**
Pre-flight	1.23 m	1.79 m	0.79 m	0.15 s
Post-flight	2.30 m	1.13 m	3.75 m	1.02 s

b.) Given that the gymnasts are in contact with the horse for an average of 0.15 seconds, calculate the average force provided to the 70 kg gymnast of part (a) by the horse. Don't forget that the net impulse is the impulse from the NET force. Convert your answer to pounds.