## Physics 10154 - Quiz 1A

Three people are trying to slide a heavy metal box so that it moves at a constant speed across a horizontal surface toward the North. The net force required to do this is 475 N, directed North.
Person A pushes with a force of 182 Newtons in a direction 22.0° South of East.
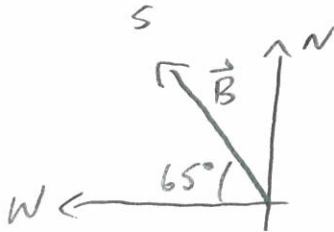Person B pushes with a force of 374 Newtons in a direction 65.0° North of West.
Person C must push with a force of what <u>magnitude and direction</u> to accomplish this task?
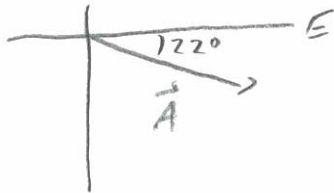
$$A_x = 182 \cos 22.0° = 168.75$$

$$A_y = -182 \sin 22.0° = -68.18$$

$$B_x = -374 \cos 65.0° = -158.06$$
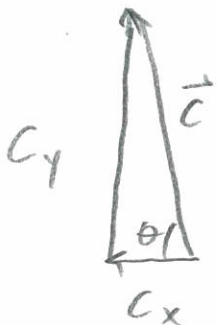
$$B_y = +374 \sin 65.0° = +338.96$$

$$\vec{R} = 475, \text{ North} \Rightarrow R_x = 0 \qquad R_y = 475$$

$$A_x + B_x + C_x = R_x$$

$$168.75 - 158.06 + C_x = 0 \Rightarrow C_x = -10.69$$

$$A_y + B_y + C_y = R_y$$

$$-68.18 + 338.96 + C_y = 475 \Rightarrow C_y = 204.22$$

$$|\vec{C}| = \sqrt{C_x^2 + C_y^2} = \boxed{204 \text{ N}}$$

$$\theta = \tan^{-1}\left(\frac{C_y}{|C_x|}\right) = \boxed{87.0° \text{ N of W}}$$