PHY232: **Quiz #2 Solution**, Pratt's lecture, Feb. 11, 2002
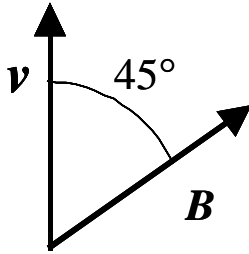
$e = 1.6{\times}10^{-19}$ C

Each question is worth **3 points**.

A proton is moving at speed $v = 1.5{\times}10^{6}$ m/s at an angle of 45° to a magnetic field **B** of 1.0 T. Both **v** and **B** are in the plane of the page.

1.   The magnitude of the force **F** on the proton is

        (a) $1.0{\times}10^{-13}$ N

        (b)   1.7´10⁻¹³ N

        (c) $2.4{\times}10^{-13}$ N

        (d) $3.1{\times}10^{-13}$ N

        (e) $3.8{\times}10^{-13}$ N

$F = qvB\sin\theta$
$= (1.6{\times}10^{-19}\text{ C})(1.5{\times}10^{6}\text{ m/s})(1.0\text{ T})(0.707)$
$= 1.7{\times}10^{-13}$ N

2.   The direction of **F** is

        (a)   To the right on the page

        (b)   Out of the page

        (c)   To the left on the page

        (d)   Down the page

        (e)   Into the page

Thumb along v
Fingers along B
Then palm is into the page.
Because q is positive, then force is **into the page**.