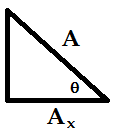
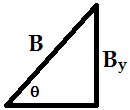
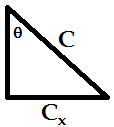
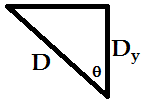
Worksheet forces and friction solutions

**I.** Solve each equation for B algebraically.

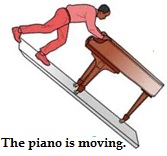
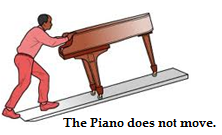
1. 2. 3. 4. 5.

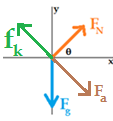
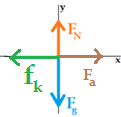
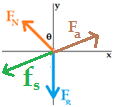
**II.** Solve each equation trigonometrically for the component vector in terms of the angle and vector.

1. 2. 3. 4.

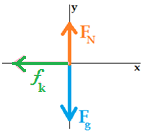
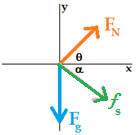
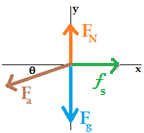
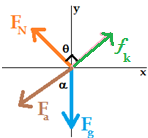
4.

**III.** Draw a free body diagram for the forces acting on the piano for each of these situations.

1.  2. 3.

**IV.** Write a mathematical equation for the sum of the forces in x and y directions for each of these free-body diagrams in terms of the declared variables.

1.2.3.4.

Note: In situation 4., the angle between the positive x axis and the kinetic friction is equal to θ, which is what I used. You could have however used the angle between the positive y axis and the kinetic friction which is equal to 90 - θ.