11 Physics **Complex Friction Problems Date:\_\_\_\_\_\_\_\_\_\_\_\_**

*These problems are more challenging and require you to review the use of the Famous Five Equations for uniform acceleration. CAUTION: Things may get a little ROUGH!*

1. Nemo, the student, passes his calculator to his neighbour Bruce by giving the calculator a push so that it slides along the desk with an initial velocity of 1.8 m/s Forward. The calculator has a mass of 350 g. The coefficient of kinetic friction between the desk and the calculator is 0.24. The calculator travels 0.45 m before it is caught by Bruce.
2. Draw a freebody diagram and find the net force on the calculator while it slides along.
3. Find the acceleration of the calculator as it slides along.
4. Find the final velocity of the calculator when it reaches Bruce.
5. A child is sitting on a toboggan while her mother pulls the toboggan along flat, snow-covered ground with an applied force of 75.0 N West. The child and her toboggan have a combined mass of 42.0 kg. If the coefficient of kinetic friction between the toboggan and the snow is 0.12, find:
6. The net horizontal force on the toboggan.
7. The acceleration of the toboggan.
8. The velocity of the toboggan after 2.0 seconds if it started from rest.

*Answers: 1 a) 0.82 N [B], b) 2.4 m/s2 [B] c) 1.1 m/s [F] 2. a) 26 N [W], b) 0.61 m/s2 [W], c) 1.2 m/s [W]*