Working Model 08
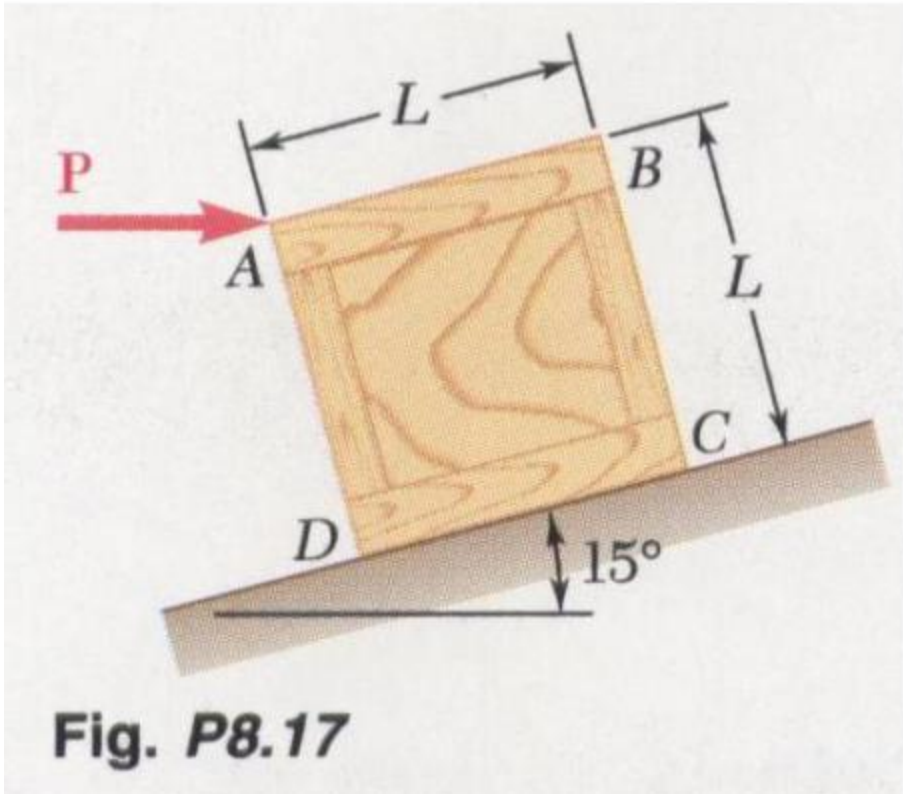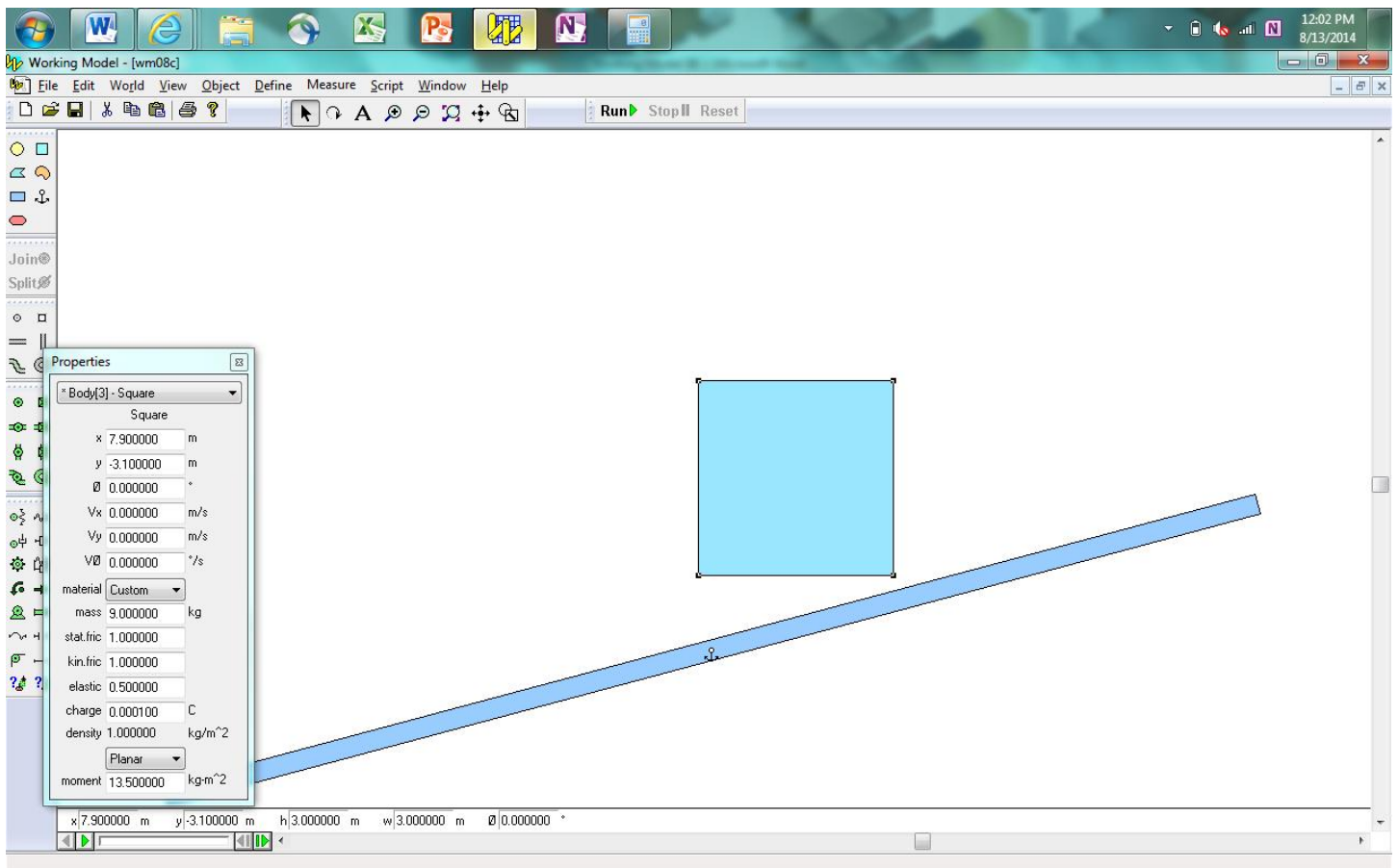
8.17 A uniform crate of mass 30 kg must be moved up along the 15° incline without tipping. Knowing that the force **P** is horizontal, determine (a) the largest allowable coefficient of static friction between the crate and the incline, (b) the corresponding magnitude of the force **P**.


Fig. P8.17

Construct the following simulation.

Change the static and kinetic coefficients of friction of the touching surfaces by double-clicking and bringing up the Properties dialog boxes. Initially, set the static coefficient of friction to 1.0. Run the simulation so that the block falls onto the base. Then use World/Start Here to reset the simulation to the new point.
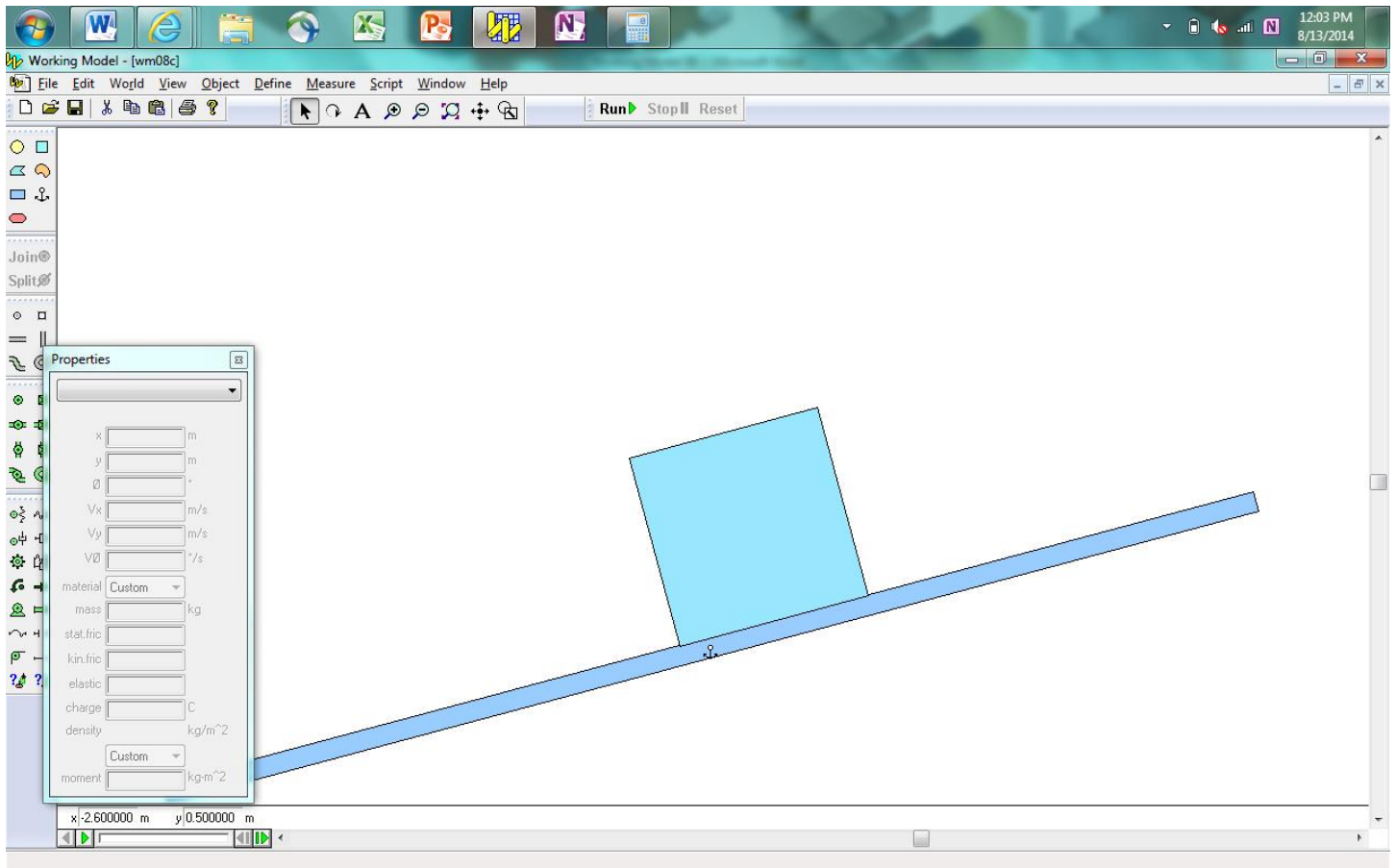
Place the force onto the corner of the block.
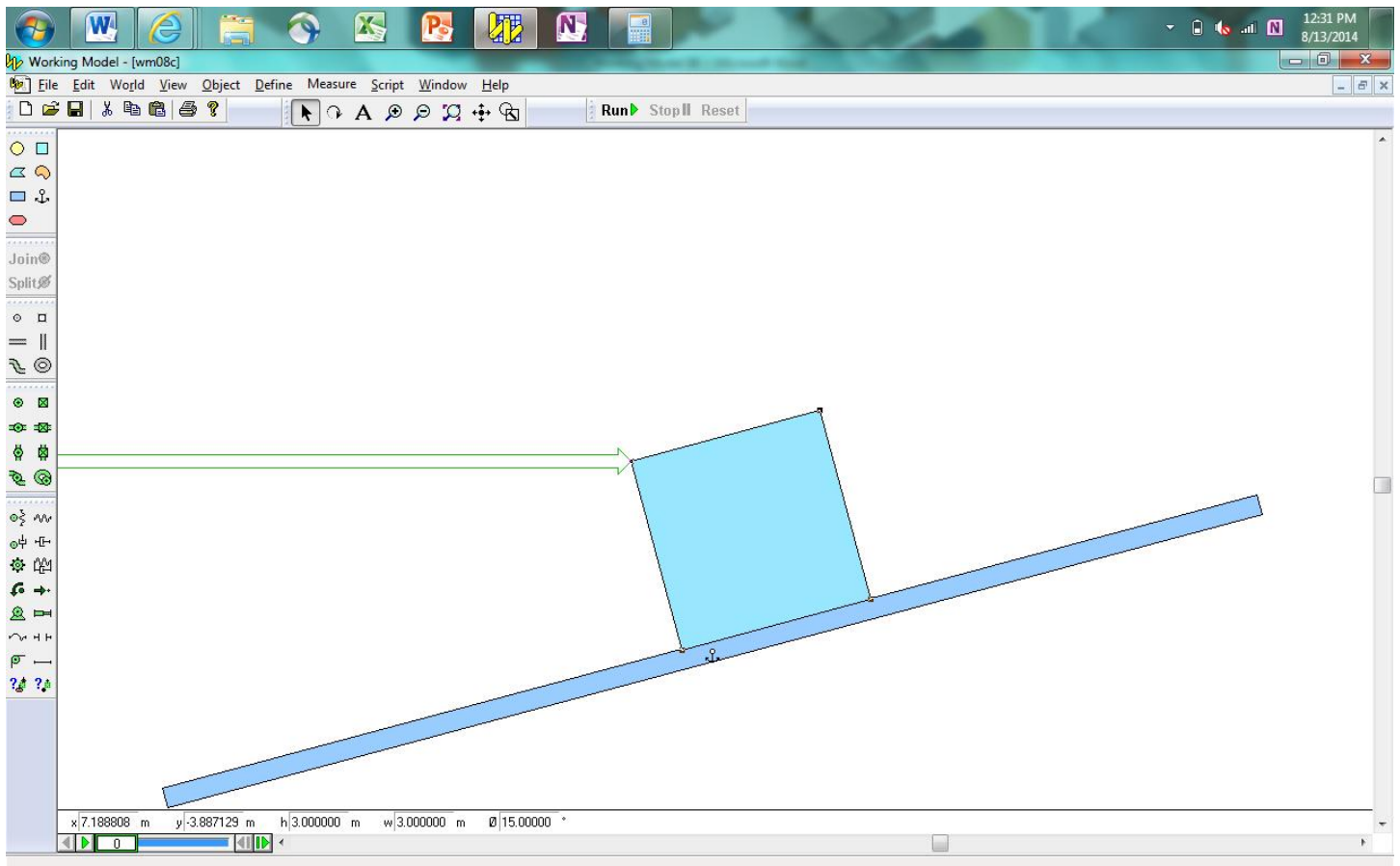
Run the simulation iteratively to determine the force required for the block to move. Then iteratively determine the static friction coefficient for the block to slide instead of tip.

For $P = 255$ N:

μ_s	Result
0.5	Slides
0.6	Tips
0.55	Slides
0.56	Tips
0.555	Tips
0.551	Tips
0.550	Slides

$$\mu_s = 0.550, \qquad P = 255 \text{ N}$$

When the results of your model match those shown above, take a screenshot of the model (with numerical values showing), copy and paste it into Microsoft Word, save it as a pdf file, and submit it to the Dropbox in Pilot.