PHYS 212 Alternating Current (ac) Voltage Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



 



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A rectangular coil of *N* turns and of length *a* and width *b* is rotated at frequency *f* in a uniform magnetic field http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c30/math/math002.gif, as indicated in Fig. [30-38](http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c30/halliday9118/halliday9088c30/halliday9088c30xlinks.xform?id=halliday9088c30-fig-0038). The coil is connected to co-rotating cylinders, against which metal brushes slide to make contact. (a) Show that the emf induced in the coil is given (as a function of time *t*) by

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| http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif |
| http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c30/math/math091.gif |   (30-0) |
| http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif |

This is the principle of the commercial alternating-current generator. (b) What value of *Nab* gives an emf with http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/glyphs/isomscr/U02130.gif0 = 160 V when the loop is rotated at 60.0 rev/s in a uniform magnetic field of 0.500 T? |