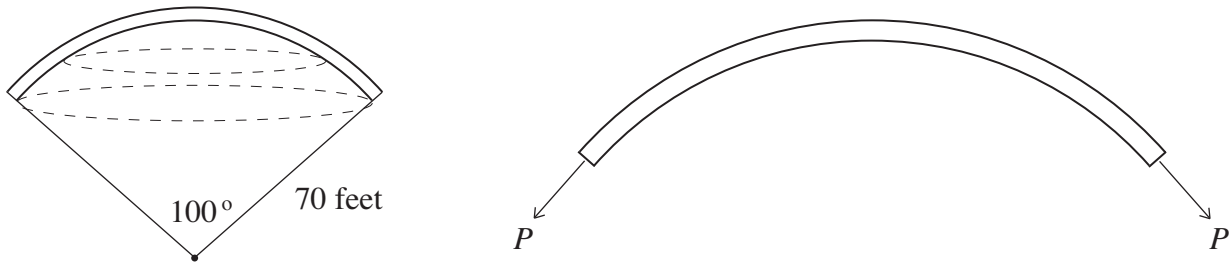


Quiz 4. February 23, 2011. Name

1. Not much is known about the original dome of the Hagia Sophia other than that it was 10 feet lower than the current one. It is safe to assume that the inner and outer surfaces of the first dome were determined by concentric hemispheres. Since the first dome was lower, let's assume that it was flatter, and that the inner and outer radii of the concentric hemispheres were 70 feet and 72.5 feet respectively. Suppose that the first dome (as the current one) was supported by 40 ribs that descended to the base of the dome between each of 40 windows. The figure below provides a sketch



of the shell above the gallery of windows. Using the information in the sketch, the estimate of 23,500 cubic feet for the volume of the original dome, and the weight of the masonry of the shell as 110 pounds per cubic foot, estimate the force P that each of the 40 ribs exerted on the base of the original dome.

2. Describe the basic structural scheme (along with its components) of a typical Gothic cathedral. (Recall that the word “structural” refers to features that are relevant to insure the stability of the building.) Please use sketches to illustrate.

3. The figure below shows a regular pentagon with center O and vertices labelled as indicated. Express the revolution or “flip” F around the vertical axis through O in numerical notation. Then express the counterclockwise rotation R through 216° around O in numerical notation. Determine the product RF (in numerical notation) and then interpret this product geometrically by referring to the figure.

