Airbus/WSU High School Wingbox Challenge

Prize money

1st Prize : $1000

2nd Prize : $500

3rd prize : $250

Deadline : March 29th, 2019

The Challenge

- Wings are a critical part of airplanes
  - They carry the weight of the plane
  - They are necessarily long and skinny
  - The wingbox is the core structure of the wing
- Engineers work very hard to make the wingbox light, strong, and stiff
- Here is a chance for you to do the same, & more!
  - Work with Airbus & WSU engineers
  - Start your future with WSU & with Airbus
  - Win prize money!

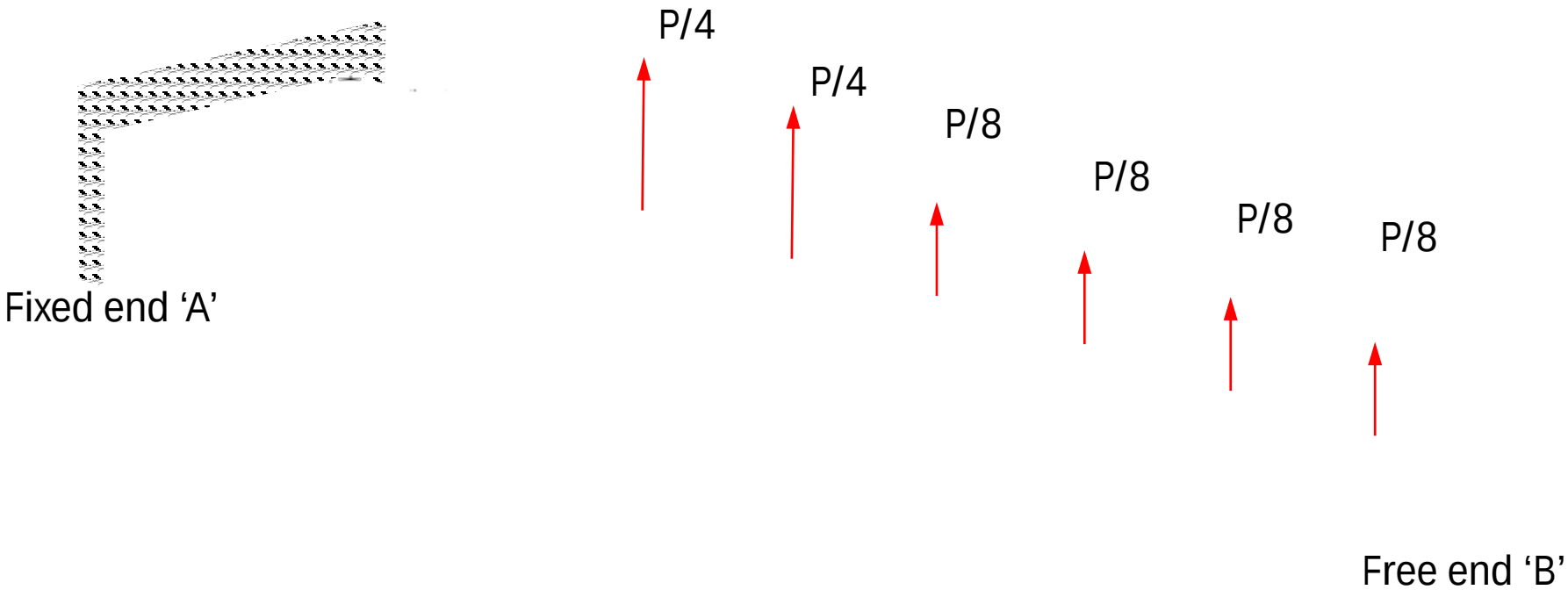
The Challenge

https://theallnewairbusa350xwb.wordpress.com/2013/02/08/the-all-new-airbus-a350xwb/

http://sahil34935.blogspot.com/2013_02_01_archive.html

The Challenge

Using balsa sticks, design and build the lightest[A], strongest[B], and stiffest[C] wingbox. The wingbox should withstand a minimum P=5 lbs. to qualify.



A. Minimize the weight
B. How much force it can withstand
C. Higher stiffness implies smaller deflections

Deliverables

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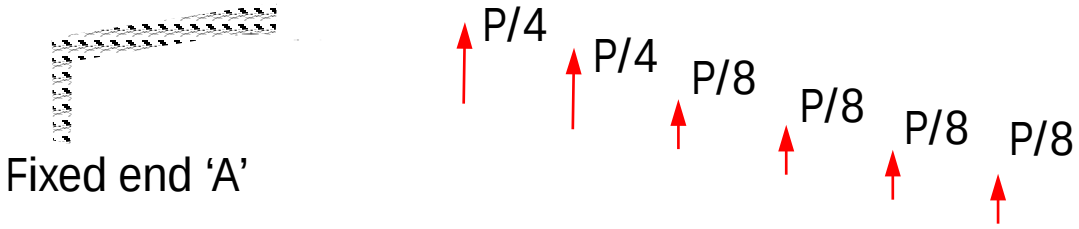
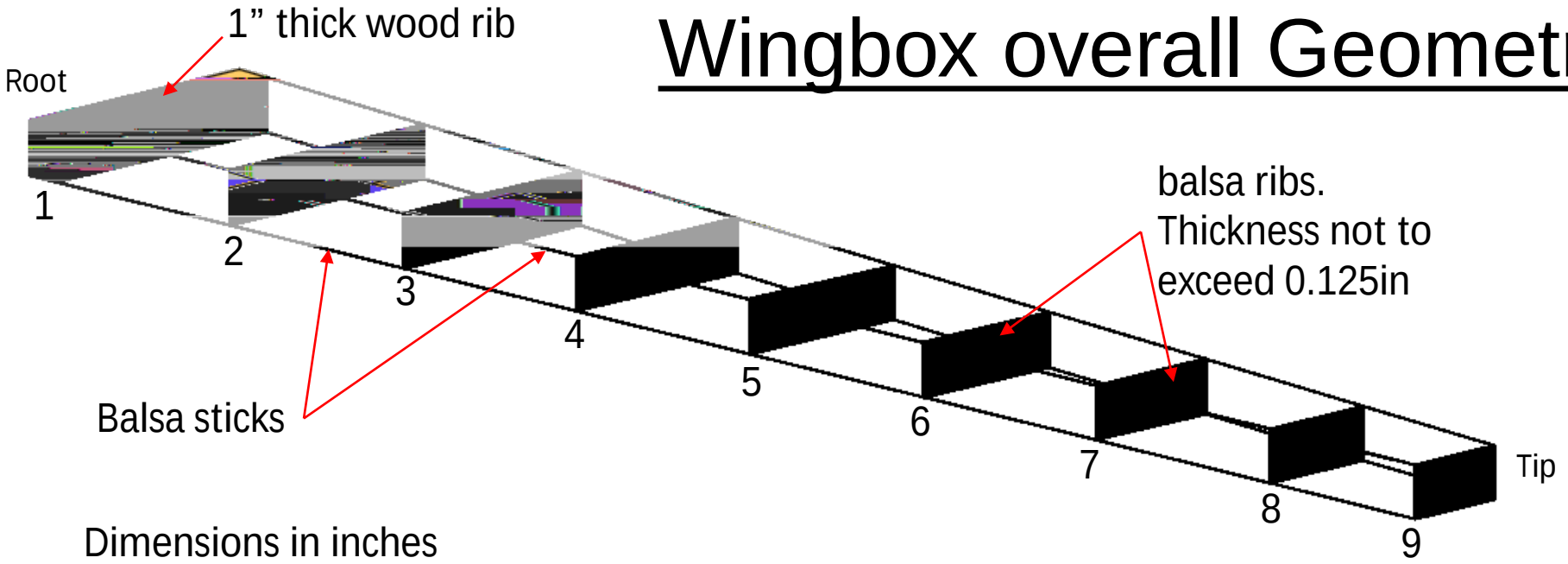
Testing of Wingboxes

- The Wingboxes will be tested during the Annual Engineering Open House (~ 1st week of May. Exact dates will be announced when they become available).
- The Wingboxes will be prepped for testing (ends casted, loaders mounted) after the teams submit their wingboxes to WSU

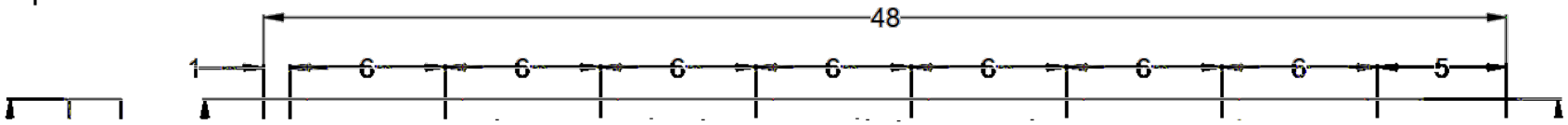


Wingbox overall Geometry

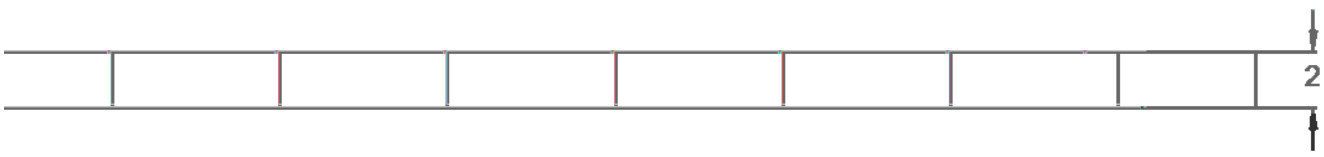


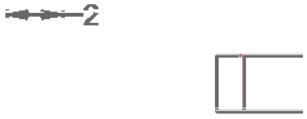
Dimensions in inches

Tip View



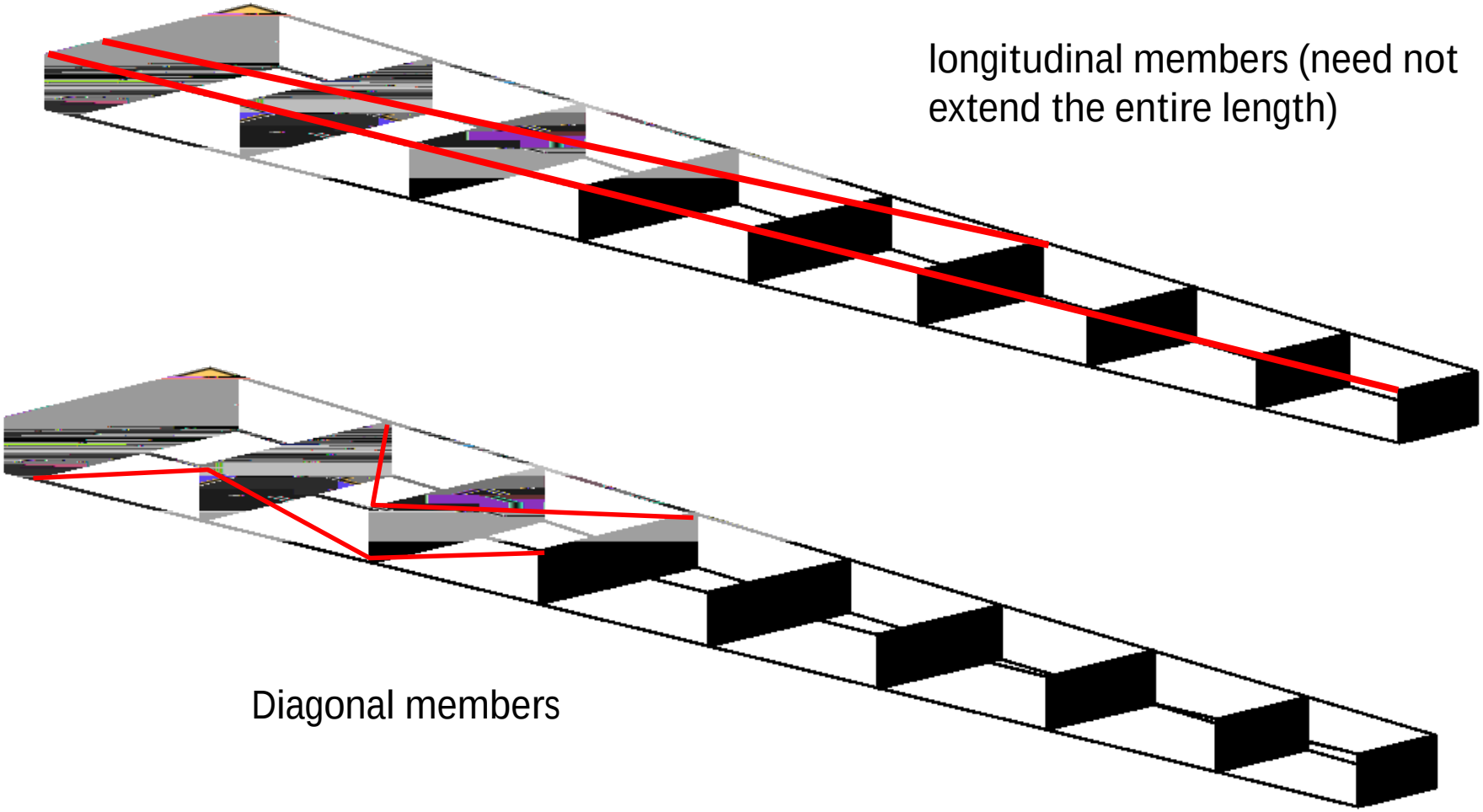
Top View





Front View

NOTE (1): Acceptable configuration examples….



Use any combination of longitudinal and diagonal members as long as

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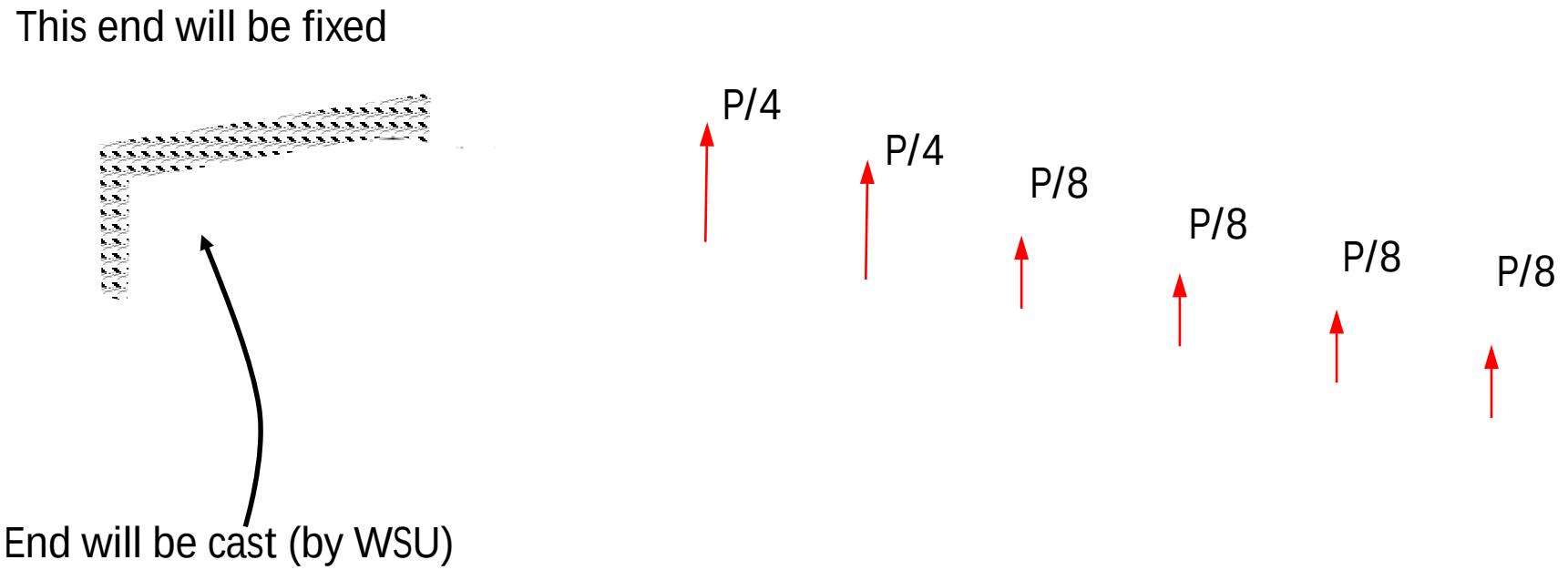
NOTE (2):

- The balsa sticks (extending the length of the wingbox) may pass through recesses cut in the ribs or may be placed along the edges of the ribs. In the latter case, the dimension of the ribs must be altered such that the overall dimension remains the same. For illustration purposes, rib #1 has

Design Constraints

- Materials
  - Balsa sticks with only 1/8-inch square or smaller (square)cross-

Wingbox Loading



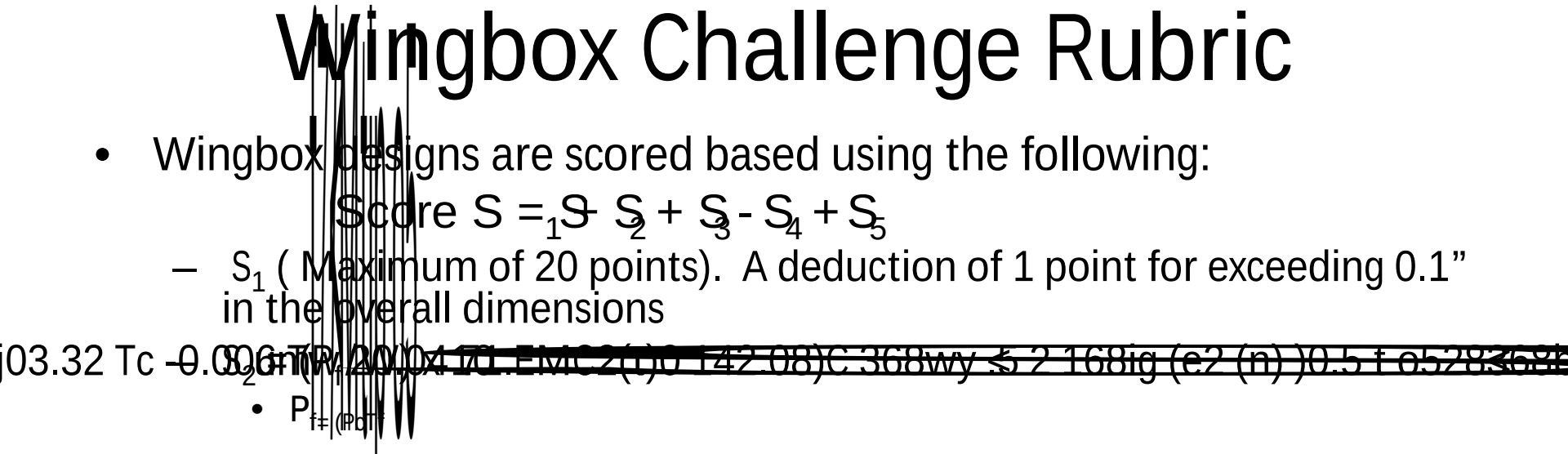
The Wingbox will be loaded using forces as illustrated in the figure.

Wingbox Challenge Rubric

- Wingbox designs are scored based using the following:

$$\text{Score } S = S_1 + S_2 + S_3 - S_4 + S_5$$

  - S_1 (Maximum of 20 points). A deduction of 1 point for exceeding 0.1” in the overall dimensions
  - S_2 [illegible]
    - P_f [illegible]



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ENTRY FORM

School Name & District:_____