

Final Design Prototype Grading Details

Your team's grade for your final design prototype will be graded based on meeting the design requirements and criteria as outlined in this document. Be sure to understand what these calculations mean and how it will impact your grade. It will be very difficult to earn the maximum points in every metric, so choose where you focus. Your grade for the final design prototype will be calculated using Equation 1:

$$\text{Grade} = (\text{Total Points Earned}) - (\text{Total Points Lost due to Penalties}) + (\text{Bonus Points}) \quad (1)$$

Where:

Grade = Assigned grade out of 135 total points

Details about the metrics that will be used for 'Total Points Earned', 'Total Points Lost due to Penalties', and 'Bonus Points' can be found below in Tables 1-3, respectively.

Table 1: List of each performance metric and number of points you can earn for each

Metric	Points Earned	Maximum Points
Base Points	25	25
Ability to produce multiple tones from each instrument	$\frac{\#_producing_multiple_tones}{n} \times 20$	20
Cost (based on final cost of each instrument)	$\frac{15n - total\ cost}{5n} \times 15$	15
Tone quality produced by instruments (based on max % deviation from theoretical fundamental frequencies for high/low notes for each instrument. <i>Failure to report a value in the final report will results in 2pts for each instrument not reported.</i>)	$\frac{1}{n} \sum_i \left[\frac{100 - deviation_i}{95} \times 15 \right]$	15
Quality of the track (based on class/expert evaluations) Song Difficulty Weightings (SDW) <ul style="list-style-type: none"> • "Ode to Joy" – 10 • "ASU Alma Mater" – 15 • "ASU Fight Song" – 20 	$\frac{Your_Team_Score}{Class_Maximum_Score} \times SDW$	15 (20 for the most difficult song)
Creativity (based on class/expert evaluations)	$\frac{Your_team_score}{Class_Maximum_Score} \times 15$	15
Craftsmanship (based on class/expert evaluations)	$\frac{Your_team_score}{Class_Maximum_Score} \times 15$	15
Aesthetics (based on class/expert evaluations)	$\frac{Your_team_score}{Class_Maximum_Score} \times 15$	15
Total Possible Points Earned		135

*Note: n=number of active members on the team

Table 2: List of each penalty and number of points lost for each

Penalty	Points Lost
No proof (drawing) is given that instruments will all fit within a 2'x2'x2' box or instruments will not fit within the 2'x2'x2' box	10
Three different types of instruments (percussion, wind, string) are not all represented	5 for each type missing
Violated the length of the pipe/string constraint	10
Did not stay within the \$15/instrument budget	5 for each instrument over budget
Materials used are not approved/included in budget	10
Total Possible Points Lost	60

Table 3: List of each possible bonus point opportunity

Metric	Points Awarded
Lowest Total Cost	5
Best Tone Quality (Lowest sum of percent deviation based on measurements)	5
Best Song Rendition (as voted by class/experts)	5
Most Creative (as voted by class/experts)	5
Best Craftsmanship (as voted by class/experts)	5
Best Aesthetics (as voted by class/experts)	5
Total Possible Bonus Points	30

NOTE: This is a team grade on the final design (set of 3 or 4 instruments) and so all team members will receive the same grade for the prototype. Final Design Prototypes may be further adjusted based on the actual outcomes of the final demonstration at the instructor's discretion.