

Engineering Design Process Mission Folder Scorecard

Use of Engineering Design

Suggested file attachments: bibliography, experimental procedure, photos of experiment, data spreadsheets, charts, graphs, PowerPoint presentations if used as part of experiment

Total maximum points in this section: 350

<i>Mission Folder Questions and Answers</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
Problem Statement				
<p>What problem in your community did your team try to solve? Why is this problem important to your community?</p>	Selected problem deals with an interesting or challenging community issue	15	<p>0-3: Does not state (0) or does not answer appropriately (3) 4-6: Statement, but is not a problem (4), states a problem but not clear (6) 7-9: States a problem, but rather generic in nature 10-12: States an interesting or challenging problem 13-15: States a very unique problem</p>	
<p>The team's answer will be placed here.</p>	Clear and concise question, thesis statement, or problem statement	20	<p>0-5: Does not state (0) or answers but not appropriately (5) 6-9: Statement but is not a problem (6), states a problem but is vague (9) 10-13: Statement is generic in nature, lacks detail 14-16: Statement is clear 17-20: Statement is very clear and concise</p>	
<p>List at least 10 resources you used to complete your research (e.g., websites, professional journals, periodicals, subject matter experts). Use multiple types of resources and do not limit yourself to only websites.</p>	Literature search is extensive and scholarly sources are reputable and varied	20	<p>Add 1 point for EACH generic resource (no detail) Add 2 points for EACH specific resource</p>	
<p>The team's answer will be placed here.</p>				
<p>Describe what you learned in your research.</p>	Describes relevant information that relates to the selected Mission Challenge	20	<p>0-5: Does not state (0) or answers but not appropriately (5) 6-9: Statement but does not related to Mission Challenge (6), statement but is vague (9) 10-13: Statement is generic in nature, lacks detail 14-16: Statement is clear, relates relevant information to Mission Challenge 17-20: Statement is very clear, states what was learned and how it relates</p>	
<p>The team's answer will be placed here.</p>				

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Experimental Design				
<p>Develop a design statement. Be sure to describe what exactly your device should be able to do. Do not describe HOW it's going to do what it needs to do.</p> <p>The team's answer will be placed here.</p>	<p>Develops a design statement that is logical based on an analysis of all research</p>	15	<p>0-3: Design statement is missing or inaccurate 4-6: Design statement is very vague 7-9: Design statement describes what the device should be able to do, lacks some detail 10-12: Design statement describes what the device should be able to do, is logical and based on analysis of all research, minor details lacking 13-15: Design statement describes what the device should be able to do, is logical and based on analysis of all research, clear and concise</p>	
<p>Determine the criteria for a successful solution and identify constraints for your design. Discuss what the device must have in order to accomplish its job and the restrictions of the device (i.e. the size, the cost, the weight, etc.)</p> <p>The team's answer will be placed here.</p>	<p>Criteria and constraints are valid, measureable, and address the design statement</p>	15	<p>Add 3 points: Lists all of the criteria needed (No list = 0, Minimal = 1, Missing one/two = 2, Lists all = 3) Add 3 points: Lists all of the constraints needed (No list = 0, Minimal = 1, Missing one/two = 2, Lists all = 3) Add 1 point to EACH of the above if very detailed in description Add 1 point: Are all criteria and constraints valid? Add 1 point: Are all criteria and constraints measureable? Add 5 points: Do the criteria and constraints address the design statement?</p>	
<p>Identify the relevant variables you will use to test your prototype or model and explain how you will measure your variables.</p> <p>The team's answer will be placed here.</p>	<p>Relevant variables are identified and an explanation is given to how they will be measured</p>	15	<p>Add 7 points: Correctly identifies relevant variables Add 7 points: Correctly identifies how they will measure the variables Add 1 point: Correctly identifies both</p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Build Model or Prototype				
<p>Develop a design and list the materials you used in your design. Include technologies you used (e.g., scientific equipment, internet resources, computer programs, multimedia, etc.).</p> <p>The team's answer will be placed here.</p>	<p>Appropriate use of materials and technology as part of the design</p>	30	<p>0-5: Does not state (0), or answers but not appropriate materials for design (5)</p> <p>6-11: Lists materials, but the materials are vague, many missing, some not appropriate</p> <p>12-18: Lists specific materials and equipment, some missing or some not appropriate</p> <p>19-25: Lists specific materials, equipment, and technologies that are appropriate for design, one or two missing</p> <p>26-30: Lists all specific materials, equipment and technologies that are appropriate for design</p>	
<p>Explain how you built your prototype(s) or model(s). Include each of the steps in your process. Include all safety precautions used by your team as step one.</p> <p>The team's answer will be placed here.</p>	<p>The prototype(s) or model(s) is(are) built sufficiently and is a valid test of the design statement.</p>	50	<p>0-10: No design steps listed (0), or up to 10 points for listing something (no details or is not a valid test of the design statement), does not address safety precautions</p> <p>11-20: Not a valid test of the design statement, describes steps to design the model(s) or prototypes, lacks detail, missing many steps, missing safety precautions</p> <p>21-30: A valid test of the design statement, lists steps, some steps missing and/or detail missing, few safety precautions</p> <p>31-40: A valid test of the design statement, minor steps or details missing, includes all safety precautions</p> <p>41-50: A valid test of the design statement and can be replicated by anyone</p>	
	<p>Use of an original, resourceful and novel approach to engineering design</p>	20	<p>0-5: Does not state (0), answers but not original, resourceful or novel (5)</p> <p>6-9: Design is either original, resourceful or novel (only one)</p> <p>10-13: Design is either original, resourceful or novel (only one but is very detailed)</p> <p>14-16: Design is either original, resourceful or novel (only two)</p> <p>17-20: Design is either original, resourceful and novel (all three)</p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Test Prototype or Model				
<p>Present the data you collected and observed in your testing. Use of data tables, charts, and/or graphs is encouraged.</p> <p>The team's answer will be placed here.</p>	<p>A sufficient amount of data is collected and well-presented</p>	30	<p>0-5: Very minimal or no data presented 6-11: Data collected, appropriate data tables OR either displayed as charts/graphs 12-18: Data collected, appropriate data tables AND either displayed as charts/graphs 19-25: Data collected from at least 3 trials, appropriate data tables OR displayed as charts/graphs 26-30: Data collected from at least 3 trials, appropriate data tables AND displayed as charts/graphs</p>	
<p>Analyze the data you collected and observed in your testing. Does your data support or refute your design statement? Do not answer with a "yes" or "no." Explain your answer using "Our data supports/refutes the design statement because . . ." Explain any sources of error and how these could have affected your results.</p> <p>The team's answer will be placed here.</p>	<p>Appropriate use of mathematical calculations</p>	15	<p>0-3: Does not analyze (0), or incorrect calculations used (3) 4-6: Analyzes some of the data correctly, some incorrectly 7-9: Minor errors in data calculations 10-12: Analyzes data correctly 13-15: Analyzes data correctly, uses appropriate significant figures</p>	
	<p>Explains how the data supports or refutes the design statement</p>	15	<p>0-3: Does not explain (0), or incorrect explanation used/does not use prompt (3) 4-6: Uses correct prompt, does not explain 7-9: Uses correct prompt, explains but very vague 10-12: Uses correct prompt, explains, lacks some detail 13-15: Uses correct prompt, explanation very thorough</p>	
	<p>Lists sources of error and explains how these could have affected the results</p>	15	<p>0-3: Does not list any errors (0), or incorrect explanation (3) 4-6: Lists sources of error only, no explanation 7-9: Lists sources of error, explains how affected the results, but vague 10-12: Lists sources of error, explains how affected the results, lacks some detail, includes data tables, charts and/or graphs 13-15: Lists sources of error, explanation very thorough AND includes data tables, charts and/or graphs</p>	

Mission Folder Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Drawing Conclusions				
<p>Interpret and evaluate your results and write a conclusion statement that includes the following: Describe what you would do if you wanted to retest or further test your design. Evaluate the usefulness of your prototype or model. What changes would you make to your prototype or model for the future, if any?</p> <p>The team's answer will be placed here.</p>	Description of how the team would retest or further their prototype	10	0-3: Does not describe (0), or incorrect description (3) 4-5: Describes how team would retest or further test, very vague 6-7: Describes how team would retest or further test, lacks detail 8-9: Detailed description for retesting or further testing their hypothesis 10: Detailed description for retesting or further testing their hypothesis, very thorough and clear	
	Evaluation of the usefulness of the prototype or model	15	0-3: Does not describe (0), or incorrect explanation (3) 4-6: Evaluates prototype or model, but vague 7-9: Evaluates prototype or model, lacks detail 10-12: Evaluates prototype or model, has detail 13-15: Evaluates prototype or model, explanation very thorough	
	Changes the team would make to their prototype or model	10	0-3: Does not describe (0), or incorrect description (3) 4-5: Lists changes to prototype or model, very vague 6-7: Lists changes to prototype or model, lacks detail 8-9: Lists changes to prototype or model, has detail 10: Lists changes to prototype or model, very thorough and clear	
	Appropriate use of engineering terminology throughout the "Use of Engineering Design Process" section	10	0-3: Does not use at all (0) or very minimal (3) 4-5: Use of engineering terminology is limited 6-7: Uses some appropriate terminology, some inaccurate 8-9: Uses appropriate terminology throughout 10: Uses appropriate terminology throughout, uses significant digits	
	Proper use of grammar, spelling and punctuation throughout the "Use of Engineering Design Process" section	10	0-3: 11 or more errors in document 4-5: Correct grammar, spelling, and punctuation throughout (9-10 errors) 6-7: Correct grammar, spelling, and punctuation throughout (5-8 errors) 8-9: Correct grammar, spelling, and punctuation throughout (1-4 minor errors) 10: Correct grammar, spelling, and punctuation throughout (no errors)	
Use of Engineering Design Subtotal				

Benefit to the Community

Suggested file attachments: brochures, fliers, posters, website links

Total maximum points in this section: 90

<i>Mission Folder Question and Answer</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<p>How could your design help solve your problem and benefit your community? Describe next steps for further research/design and how you have or how you could implement your solution in the future.</p> <p>The team's answer will be placed here.</p>	Results show the potential to resolve the community problem or significantly impact the community problem	75	<p>Add 14 points for each of the following (and add 5 points each if very detailed and clear):</p> <ul style="list-style-type: none"> - Answers "how could your design help solve your problem?" - Answers "how could your design benefit your community?" - Describes the next steps for research/design - Answers "how have/could you implement your solution in the future?" 	
	Proper use of grammar, spelling and punctuation	15	<p>0-3: 7 or more errors in Benefit to the Community section</p> <p>4-6: Correct grammar, spelling, and punctuation in section (5-6 errors)</p> <p>7-9: Correct grammar, spelling, and punctuation in section (3-4 errors)</p> <p>10-12: Correct grammar, spelling, and punctuation in section (1-2 minor errors)</p> <p>13-15: Correct grammar, spelling, and punctuation in section (no errors)</p>	
Benefit to Community Subtotal				

Team Collaboration

Suggested file attachments: Breakdown of team responsibilities, team plan, experiment schedule

Total maximum points in this section: 60

<i>Mission Folder Question and Answer</i>	<i>Judging Criteria</i>	<i>Max Points</i>	<i>Scoring Details</i>	<i>Score</i>
<p>Describe the plan your team used to complete your Mission Folder. Be sure to explain the role of each team member and how you shared and assigned responsibilities. Describe your team's process to ensure that assignments were completed on time and deadlines were met.</p> <p>The team's answer will be placed here.</p>	Team participates in planning and encouraging others	20	<p>Add 7 points - A plan is stated (Add 3 more points if very detailed)</p> <p>Add 7 points - A description of how students encouraged each other (Add 3 more points if very detailed)</p>	
	Team members fulfill a broad range of responsibilities	15	<p>Add 6 points - Description of roles is described and assigned (Add 2 more points if very detailed)</p> <p>Add 5 points - Responsibilities assigned for each team member (Add 2 more points if very detailed)</p>	
	Each team member follows the team action plan and helps others stay on track	15	<p>Add 6 points - Evidence of EACH team member followed the action plan/calendar (Add 2 more points if very detailed)</p> <p>Add 5 points - Evidence of EACH team member helped others stay on track (Add 2 more points if very detailed)</p>	
	Proper use of grammar, spelling and punctuation	10	<p>0-3: 5 or more errors in Team Collaboration section</p> <p>4-5: Correct grammar, spelling, and punctuation in section (4 errors)</p> <p>6-7: Correct grammar, spelling, and punctuation in section (3 errors)</p> <p>8-9: Correct grammar, spelling, and punctuation in section (1-2 minor errors)</p> <p>10: Correct grammar, spelling, and punctuation in section (no errors)</p>	
Team Collaboration Subtotal				
Mission Folder Total Score				