

## CHECKPOINT 5: REPORT PART 1

The purpose of Report Part 1 is to organize the preliminary information of the investigation. Use the outline on the next page to help you complete Report Part 1. Just like your Research Summary (checkpoint 4), this report should be **typed (or neatly written in pen) and written in third person**. Personal pronouns are not permitted and will result in a grade penalty if used. The copy submitted for a grade must be in the same format as the outline (not paragraph form).

For Part 1, only the following sections are required:

- A. Problem statement:** Copy the investigative question from your proposal.
- B. Proposed solution:** Copy the solution you will create or develop to meet the need or solve this specific problem.
- C. Design requirements:** Here is where you will define your criteria and constraints for your design.

| <b>Criteria</b> = specific requirements and standards a design should meet  | <b>Constraints</b> = limitations that define the boundaries of a design process  |
|---|--|
| How will the design solve the problem? How will it work? What will it look like? Size? Shape? Appearance? Performance? How will it be used? | What is the budget? What materials will you need? How durable will it be? Is this solution safe for the public to use? |

- D. Preliminary designs:** Explore at least **five** different designs that could solve the problem. Include drawings with labeled parts of the designs.

The more detail in these drawings, the better. Use the criteria and constraints to select the design you are going to build and test.

**Pro Tip:** Use the work from your log and screenshots from your previous iterations in Checkpoint 4 to build this documentation.

- E. Final design:** Make sure the final design is identified, drawn, and labeled (include measurements using metric units). This is the only design you are required to build at this step.
- F. Materials:** List all materials needed and required to build the prototype. Make sure to include dimensions using metric units.
- G. Procedures:** These are detailed, step-by-step instructions on **how to build the prototype and how to test it**. Think of it as a cookbook. This should be a recipe that another person could use to build the exact prototype AND test it.

Specifically explain how the success of the prototype will be tested, what data will be collected, and how the data will be collected (measured).

Include diagrams/photographs where appropriate and any special steps you will take when you collect and analyze data.

**There are two options here. You can do both.**

1. **Conduct prototype trials to show product improvements over time.** In this scenario, you would test a prototype, then record the results. This will give you quantitative data showing how each change you make improves how the product or system works. You need a minimum of three trials.

Example:

*I will run five tests on five dogs using my prototype. My test includes putting my heat sensor collar on each dog for 20 minutes. I will record the results for each dog. I may need to change my design in big or small ways to get it to solve the problem.*

This is an **example** that shows how you might record your results **later** in the process.

*Note these are hypothetical responses to help you in the next phase.*

|  | Dog Collar 1                            | Dog Collar 2                            | Dog Collar 3                            | Dog Collar 4                            | Dog Collar 5                            |
|--|---|---|---|---|---|
| First prototype                                | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      |
| Second prototype:<br>New sensor                | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      | Heat sensor failed                      |
| Third prototype:<br>Change in design           | Heat sensor works, too heavy for dog    | Heat sensor failed                      | Heat sensor works, too heavy for dog    | Heat sensor works, too heavy for dog    | Heat sensor failed                      |
| Fourth prototype:<br>Change in materials       | Heat sensor works, size is good for dog | Heat sensor fails, size is good for dog | Heat sensor fails, size is good for dog | Heat sensor fails, size is good for dog | Heat sensor fails, size is good for dog |
| Fifth prototype:<br>Tweak to sensor connectors | Heat sensor works, size is good for dog | Heat sensor works, size is good for dog | Heat sensor works, size is good for dog | Heat sensor works, size is good for dog | Dog tore off collar                     |

2. **Target user interview post results:** Go back to your original users and gather their feedback after seeing the results of your prototype or system results.

Example:

*I will share the results from my prototype (or system redesign) with the target users that I originally interviewed. I will then ask each of them the same questions as before. These*

results will give me qualitative and quantitative insights that I can use to show the evolution of my project. These results may even send me back to my design for some final modifications. The questions I want to focus on are \_\_\_\_\_.

This is an **example** that shows how you might record your results **later** in the process. Note these are *hypothetical responses to help you in the next phase*.

| Target User Interview Questions   | User Feedback 1                             | User Feedback 2                                     | User Feedback 3  | User Feedback 4   | User Feedback 5   | User Feedback 6                                    |
|---|---|---|--|---|---|--|
| On a scale of 1 to 5, how happy are you with the design results?                | Pre 3<br>Post 5                             | Pre 1<br>Post 5                                     | Pre 3<br>Post 5  | Pre 3<br>Post 3   | Pre 2<br>Post 5   | Pre 4<br>Post 5                                    |
| Does my current design truly address the problem for you?                       | Pre Yes, I need to see it work.<br>Post Yes | Pre It is hard to visualize<br>Post Wow, impressive | Pre Love it<br>Post Yes, I feel so much better.            | Pre Curious if it will work<br>Post It didn't really work | Pre I am skeptical<br>Post It's amazing, yes.           | Pre Yes.<br>Post Yes!                              |
| If yes, can you put a percent on how much the design solves the problem? 0–100% | Pre 80%<br>Post 100%                        | Pre 20%<br>Post 100%                                | Pre 70%<br>Post 100%                                       | Pre 80%<br>Post 50%                                       | Pre 50%<br>Post 100%                                    | Pre 80%<br>Post 100%                               |
| Do you have any ideas for improvement?  | Pre Watch weight<br>Post Nope               | Pre Too complicated<br>Post Fun colors and designs  | Pre Add a harness or clip<br>Post Test for a longer period | Pre No<br>Post Work on sensors for consistency            | Pre Circuitry on a dog seems risky<br>Post Works great! | Pre No<br>Post Could you make it into an app next? |
| How much would you be willing to pay for ___?                                   | Pre \$15<br>Post \$50                       | Pre \$5<br>Post \$100                               | Pre \$15<br>Post \$60                                      | Pre \$15<br>Post \$0–20                                   | Pre \$5<br>Post \$150                                   | Pre \$8<br>Post \$45                               |



## REPORT PART 1 OUTLINE

Due Date: \_\_\_\_\_

### Report Part 1

**ROUGH DRAFT OUTLINE – Final Copy must be typed or written neatly in pen in this format**

Name: \_\_\_\_\_

A. Problem statement: \_\_\_\_\_

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B. Proposed solution: \_\_\_\_\_

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C. Design requirements (define **criteria** and **constraints**): \_\_\_\_\_

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D. **Preliminary drawings:** Collect at least five different design drawings. Use screenshots, checkpoint artifacts, and any log drawings. Attach another blank piece of paper for more room.

E. **Final drawing, including metric labels.**

Attach another blank piece of paper for more room.

### F. Materials Needed:

- [illegible]

**G. Procedures:** Describe how you will conduct your 3+ trials and how you will use post-user data in your procedures. See examples on page 2 and 3.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

**Please note:** The following rubric is intended to support students in determining their quality of work. Rubrics help students understand what success looks like and what they should strive for in order to excel in the state Science and Engineering Fair. The results of this rubric are not to be used toward grade-level content grades.



## REPORT PART 1 RUBRIC

|                            | 2 points  | 1 point   | 0 points  | Total Points |
|----------------------------|---|---|---|--------------|
| <b>Format</b>              | Follows outline format with labels.   | Partially follows outline format with labels.   | Does not follow the outline with labels.  |              |
|                            | Typed or written neatly in pen in the third person.                                       | Some of the report is written in the third person.  | Not typed or written neatly in pen in the third person.                                   |              |
| <b>Problem Statement</b>   | The problem or need is clearly defined.   |   | The problem or need is not defined or is missing.   |              |
| <b>Proposed Solution</b>   | Clearly explains the solution that will be created to solve the problem or meet the need. | Partially explains the solution that will be created to solve the problem or meet the need. | Does not explain the solution that will be created to solve the problem or meet the need. |              |
| <b>Design Requirements</b> | Criteria are clearly defined.   | Criteria are partially defined.   | Criteria are not defined.   |              |
|                            | Constraints are clearly defined.  | Constraints are partially defined.  | Constraints are not defined.  |              |
| <b>Preliminary Design</b>  | Shows evidence of brainstorming.  | Partially shows evidence of brainstorming.  | No evidence of brainstorming.   |              |
|                            | Minimum of five different drawings/models.  | Fewer than five different drawings/models.  | Preliminary drawings missing.   |              |
| <b>Final Design</b>        | Measurements clearly labeled using metric units.  | Measurements partially labeled using metric units.  | Measurements not labeled using metric units.  |              |

|  |   |   |   |                 |
|--|---|---|---|-----------------|
|  | The final design meets criteria and constraints.                                  | The final design meets some but not all criteria and constraints.         | The final design does not meet the criteria and constraints.                              |                 |
|  | Includes appropriate labels of each part.   | Partially includes appropriate labels of each part.                       | Does not include appropriate labels of each part.   |                 |
|  | <b>4 points</b>   | <b>2 points</b>   | <b>0 points</b>   |                 |
| <b>Materials</b>                           | Lists all supplies needed.  | Lists some supplies needed.   | Did not list supplies needed.   |                 |
|  | All measurements and amounts are included and are in metric units.                | Some measurements and amounts are included and are in metric units.       | No measurements or amounts are included.  |                 |
| <b>Procedure</b>                           | Includes a step-by-step list of instructions on how to build and test prototypes. | Includes only a few steps on how to build and test prototypes.            | Does not include a step-by-step list of instructions on how to build and test prototypes. |                 |
|  | Included at least five trials in the procedure.                                   | Included fewer than five trials in the procedure.                         | Did not include trials in the procedure.  |                 |
|  | Included specifics on how data will be collected and measured.                    | Included only a few specifics on how data will be collected and measured. | Did not include specifics on how data will be collected and measured.                     |                 |
| <b>Total for Report Part 1 (Lab Grade)</b> |   |   |   | <b>/ 42 pts</b> |