Grasps model

Often investigations are done on models in closed system to understand the real world situation and then these results are analysed and evaluated to relate with actual situations. In order to check the colour of paint suitable for solar panels, the below investigation is carried out.

Goal : Measure the rate at which thermal energy is absorb by different coloured sheets
Role : A school student
Audience : Your teacher
Situation : You are given a set of equipments and asked to design an experiment to fulfil the goal
Product : You will write a safe method to do the investigation
Standards : Students need to fulfil the standards as per the rubrics shared at the end of the sheet.

Materials provided : Radiant heat source , black screen with stand, white screen with stand, silvered screen with stand, timer,

Note : students can add additional material required but must justify in the method why it was required

B (i) Explain the problem or question to be tested

Good research question :

Is Researchable - can be answered with facts/data/research	Opens the door for other areas of research - (can not be answered with opinion)
Often begins with how, why, what, which	Does not begin with who, when, how much, how many

Includes the independent and dependent variables. You can write your question in form :
How does the independent variable affect the dependent variable ?

Includes an explanation :
Explain how this is related to the topic being studied.
Explain why it is a relevant question or problem.
Includes scientific evidence or data from your research.

- Explain your research below :

B (ii) Formulate and explain a testable hypothesis

The goal of hypothesis is to help, explain and focus the direction of the experiment or research.
It should sound something like **if……then……because** If you change your independent variable, then you predict your change in dependent variable because of scientific explanation
It has to be testable
It should state the purpose of the research

❖ Write your hypothesis below :

B (iii) Explain how to manipulate the variables and how data will be collected

Variable : A Quantity / condition that can change during the experiment

Independent variable : A variable that you control during the experiment	My independent variable is I can control this variable by :
Dependent variable : A variable that you can observe or measure during / after the experiment	My dependent variable is I can observe/ measure using :
Control variable : A variable that is kept the same through out the experiment	My control variables through the experiments are :

B (iv) Design a safe logical and complete method

Describe a safe, logical and complete method in which all the materials and equipments are mentioned

- Describe a step by step guide
- Explain how you will make your experiment fair (how will you control your controlled variables)
- Explain how you will make a safe test
- Explain how you will make your experimental results accurate
- Explain how you will make your experimental results precise
- Explain how you plan to process your data. What calculations you will carry out.
- Explain how your data supports your hypothesis and answer research question

Describe a safe, logical and complete method to carry out your experiment (considering all the parameters mentioned above)

Open lab investigation		
Use the following task specific clarifications to safely complete your task		
Achievement Level	Level descriptor	Task specific clarification
0	Student does not reach a standard described by any of the standards listed below	You did not reach a standard described by any of the descriptions given below
1 - 2	Student is able to : • State : a problem or question to be tested by scientific investigation. • Outline a testable hypothesis • Outline the variables • Design a method with limited success.	•
3 - 4	Student is able to • Outline a problem or question to be tested with scientific investigation • Formulate a testable hypothesis with scientific reasoning • Outline how to manipulate the variable and how relevant data will be collected • Design a safe method in which he or she selects materials and equipments	•
5 - 7	The student is able tp : • Describe a problem or question to be tested with scientific investigation • Formulate and explain a testable hypothesis with scientific reasoning • Describe how to manipulate the variables and describes how sufficient relevant data will be collected • Describes a complete and safe method in which he or she selects appropriate materials and equipments	•
7 - 8	The student is able to : • Explain a problem or question to be tested with scientific investigation • Formulate and explain a testable hypothesis with scientific reasoning • Explain how to manipulate the variables and how sufficient relevant data will be collected • Explains a logical, complete and safe method in which he or she selects appropriate materials and equipments	•