# ENGINEERING DESIGN NOTEBOOK

**LEVEL:** Middle and High School (all grades)

**SCOPE:** Required for all MESA Day project competitions
(except: National Engineering Design Competition, Hack Attack, On-Site Design)

**OVERVIEW:** The purpose of the Engineering Note Book is for students to more closely follow the practices of an engineer in the completion of their MESA Day projects. The Engineering Design Notebook will encourage students to take a purposeful and sustained approached to building their devices. MESA projects are not designed to be completed in a single class period or day, but to be the result of thoughtful research, planning, analysis and evaluation. The lab book should provide a daily and constant written record of the thought and insight that a team is putting into their project, from initial ideas to the final completed project.

**MATERIALS:** There are two format options for note book submittals:

**Printed/Written Pages**
Teams record their lab book entries by hand or typed through a program like MS Word. Printed/handwritten loose leaf pages are then submitted (pages must all be well organized and clipped/stapled together).

**Standard Notebook**
Teams use a standard notebook (composition books, spiral notebooks, subject notebooks, etc.). Lab book page size must be equivalent or greater than that of a composition book page (approx. 9.75" length x 7.5" width). Pocket sized books, post it notes, flashcards, etc. cannot not be used. .

## REQUIREMENTS:

Notebooks are meant to clearly demonstrate and illustrate evidence of the application of the Engineering Design Process in the MESA project. One note book per team should be submitted per competition.

Engineering note book must be properly labeled (names, school, grade level, etc.) and contain and cover the following sections, with each section tabbed/labeled:

1. **IDENTIFY THE PROBLEM -** (at least 2 sentences for each question) State what is the challenge being worked on? What are the limits/constraints? How do you think you can you solve it?

2. **EXPLORE -** Find out what others have done (research). Clearly list at least 5 sources (web pages, books, etc.). Identify (cite) and describe them.

3. **DESIGN -** Brainstorm ideas (at least 3 ideas) and record them. Each idea should be represented by a sketch or drawing. Select one idea and create a plan (at least 5 sentences) to build a prototype from. Generate a list of materials for your prototype.

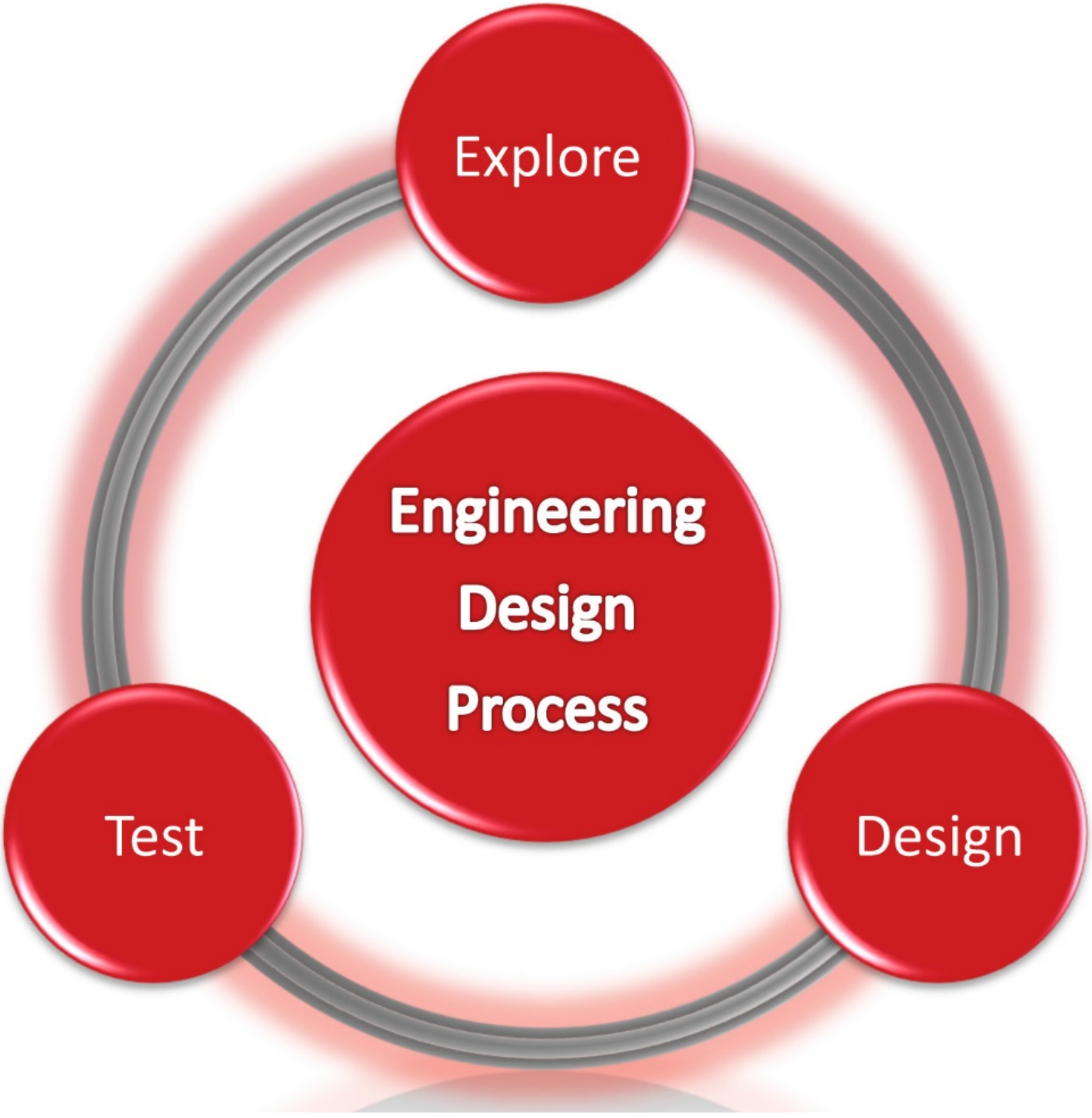
4. **CREATE -** Using your plan, build your prototype; describe the building of prototype (at least five sentences). Include a picture of the actual project prototype.

5. **TRY IT OUT -** Test your idea/prototype. Attempt at least 3 trials/attempts of your test. Measure the results of your test (by project performance criteria). Provide evidence of the use and application of at least 2 appropriate mathematical concepts in your tests.

6. **MAKE IT BETTER -** Describe how you can make the project better and what modifications you will be making (at least 5 ways you can improve project). Build and prepare competition ready project. Include a picture.

## SCORING:

Every notebook score will be a multiplier to their associated project. The Notebook Multiplier will be determined by dividing the notebook score by the maximum points. (25 point maximum)
If team does not submit a notebook their notebook multiplier will be .10.
For example, if a notebook receives 20 points. The notebook multiplier will be .80 (20/25).


Explore
Engineering Design Process
Test
Design

## Rubric for Engineering Design Notebooks (EDN).

| EDN Goals | 3 | 2 | 1 | 0 |
|---|---|---|---|---|
| **1. Explore** | | | | |
| □ Described Design Objective<br>□ Described Success Criteria<br>□ Described Constraints<br>□Described Variables and Constants | All | Most | Some | None |
| □ Described Prior Knowledge<br>□ Described Brainstorming<br>□ Described Exploration (testing materials, modelling, etc.) | All | Most | Some | None |
| □Has Research documented with at least 5 sources (website, book, video, article, interviews, etc.)<br>□Research is reliable (i.e. experts, researched websites, etc.) | All | Most | Some | None |
| **2. Design** | | | | |
| □Describes materials used<br>□Documents data from previous trials<br>□Documents modifications | All | Most | Some | None |
| □Includes sketch/photo of initial prototype<br>□Includes sketch/photo of final prototype | All | Most | Some | None |
| **3. Test** | | | | |
| □Has data in graphical form<br>□Has written description of data<br>□Multiple iterations | All | Most | Some | None |
| □Describes pros and cons of data results<br>□Discusses next steps<br>□Tests are well designed | All | Most | Some | None |
| **4. EDN Organization** | | | | |
| □Has Table of Contents or clearly labelled sections<br>□Notebook is organized | All | Most | Some | None |
| **4.2 Labeled.** Clearly labeled with School and Team Members names. | | | Yes | No |
| **Column Totals (for selected categories)** | | | | |
| | | **Total (out of 25)** | | |

**Comments/Suggestions:**