



TECHNICAL DRAWINGS / REPORTS 101

LINE TYPES

- **OBJECT LINES** Object lines depict the visible edges of an object. The edges you would see looking at the object with your naked eyes. They shown as dark, solid lines. 
- **HIDDEN LINES** Hidden lines depict invisible edges inside an object. The edges you would not see looking at the object with your naked eyes. They are shown as dashed lines. 
- **CENTER LINES** Center lines depict the center of any cylindrical-shaped object whether it be a cylinder or hole. They are shown as a long line followed by a short line, followed by a long line.

DIMENSIONS, THEIR COMPONENTS AND NOTES

- Dimensions tell how far it is from one point on an object to another point. The most basic type is called a *Linear* Dimension because it gives the straight-line distance from one point to another. There are also *Radial*, *Diameter* and *Angular* Dimensions.
- Dimensions have four basic components:
 - Dimension Text
 - Dimension Line and Arrows
 - Extension Lines
 - Gap

LINES CAN CROSS

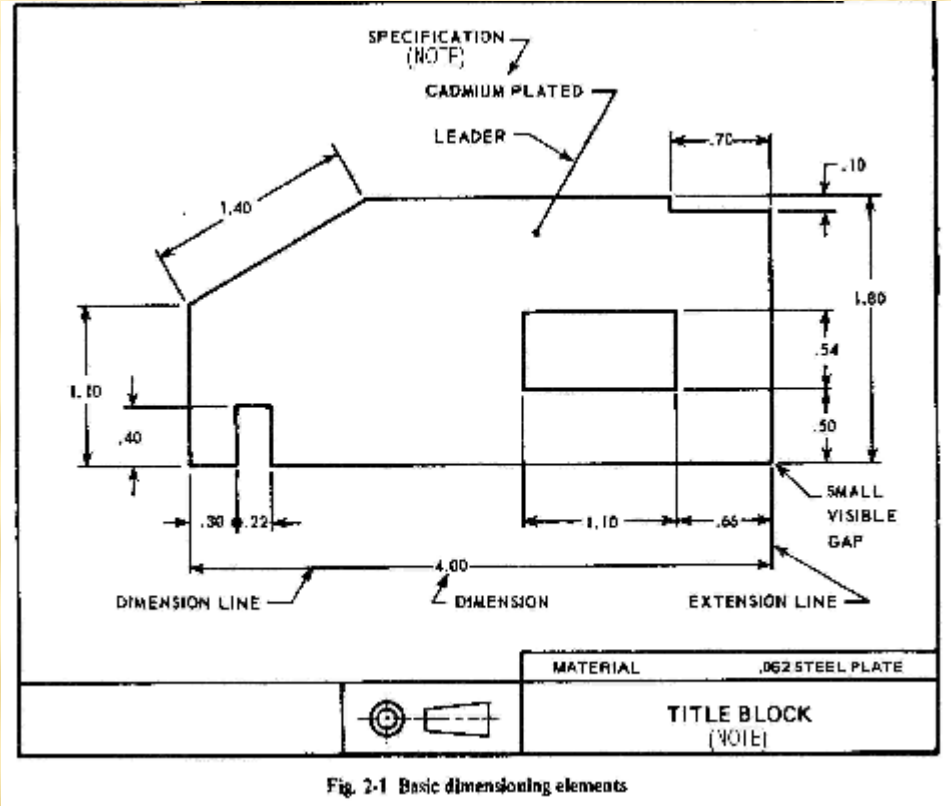


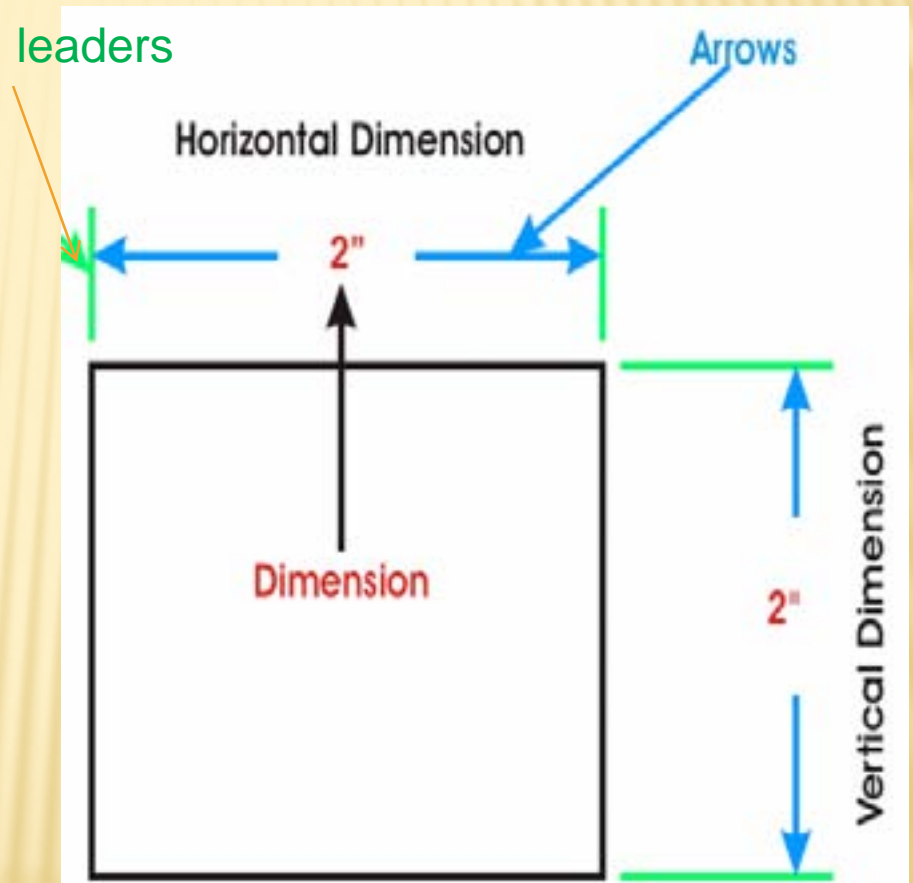
Fig. 2-1 Basic dimensioning elements

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- ✘ Notes are added text to describe things on the drawing. The simplest type is just text, as in the title of the drawing. The other type of note contains a leader, which is an arrow that points to the subject of the note.
 - ✘ The box around the drawing is called the **Title Block** or the **Format**.

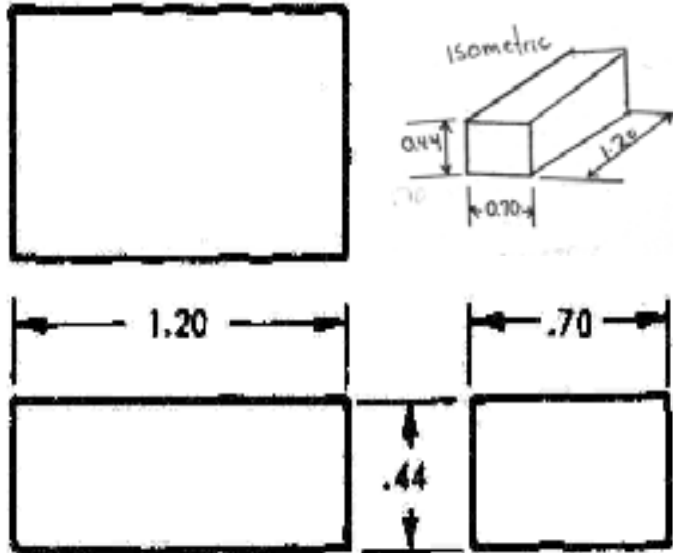
DIMENSIONS

All Dimensions have 3 parts:

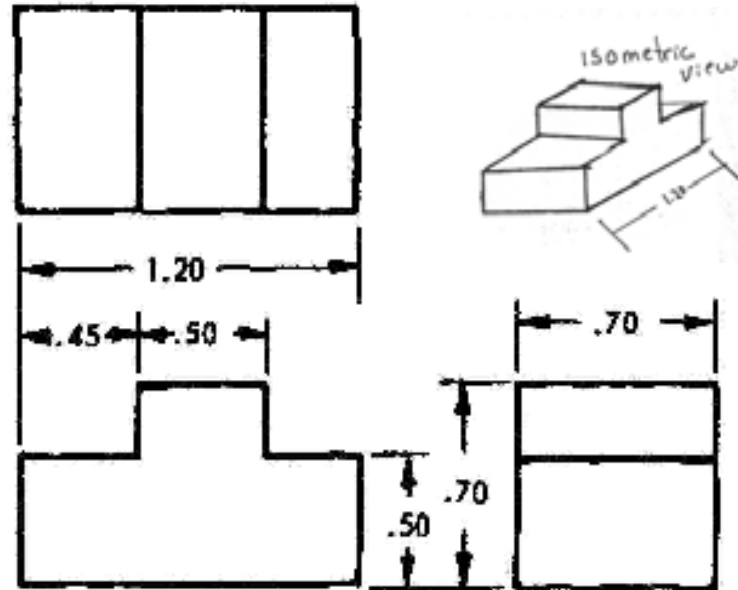
- + 2 Leaders (or brackets)
- + 2 Arrows
- + The dimension with the units (inches, feet, mm)



BASIC DIMENSIONING TIPS:



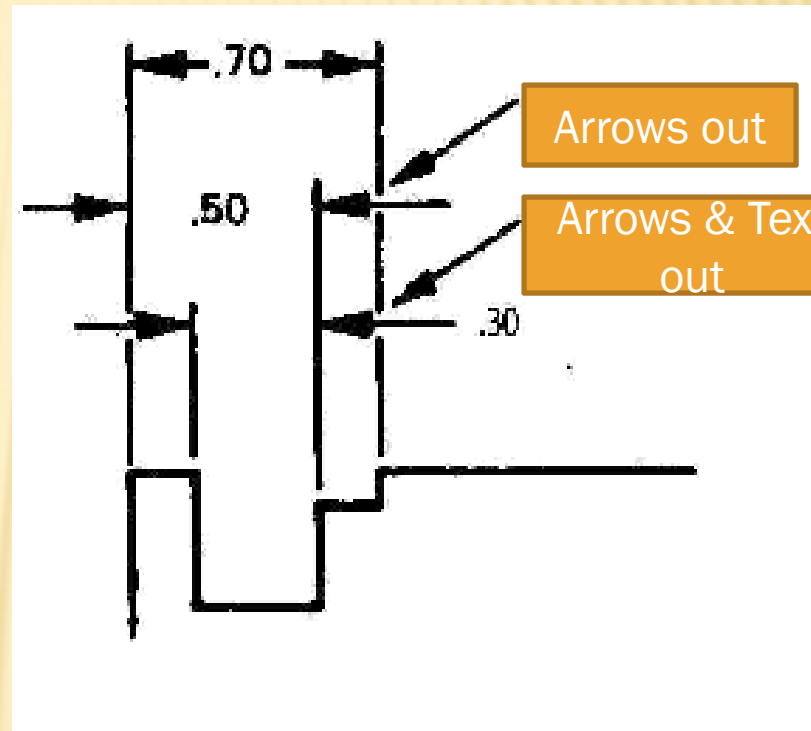
A. Place Dimensions Between Views



B. Place smallest dimension nearest the view being dimensioned

ARROW AND TEXT PLACEMENT

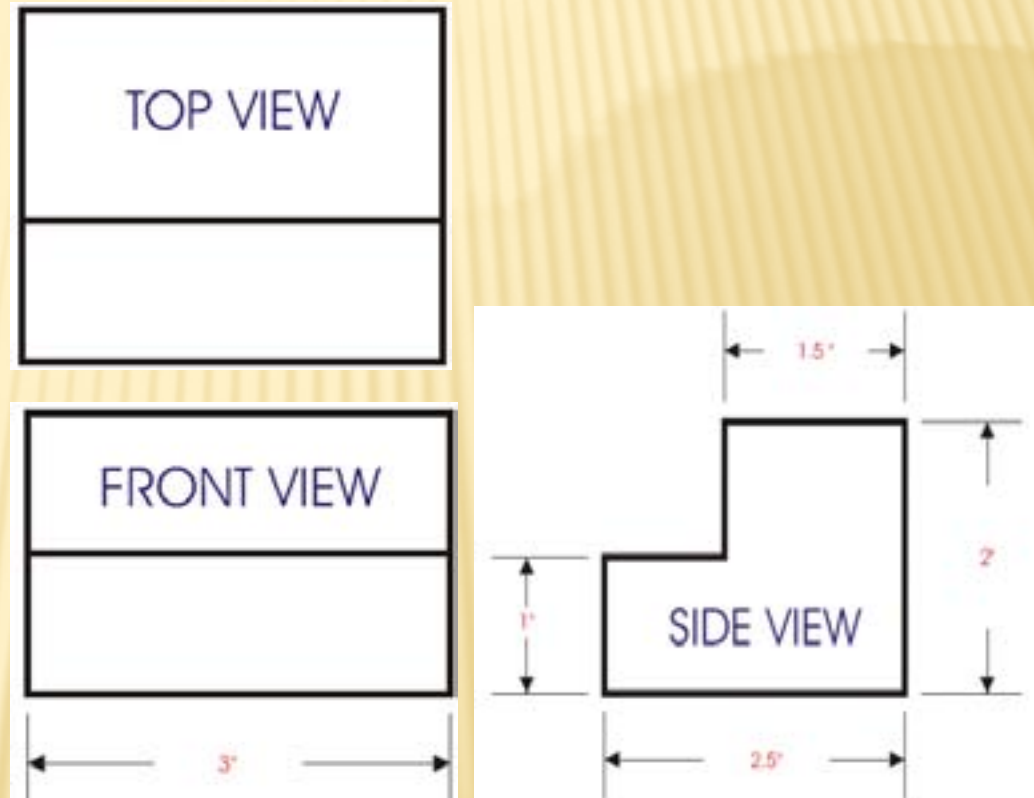
- ✘ The placement of your dimension lines (arrows) and dimension text depends on the amount of space there is between the extension lines.



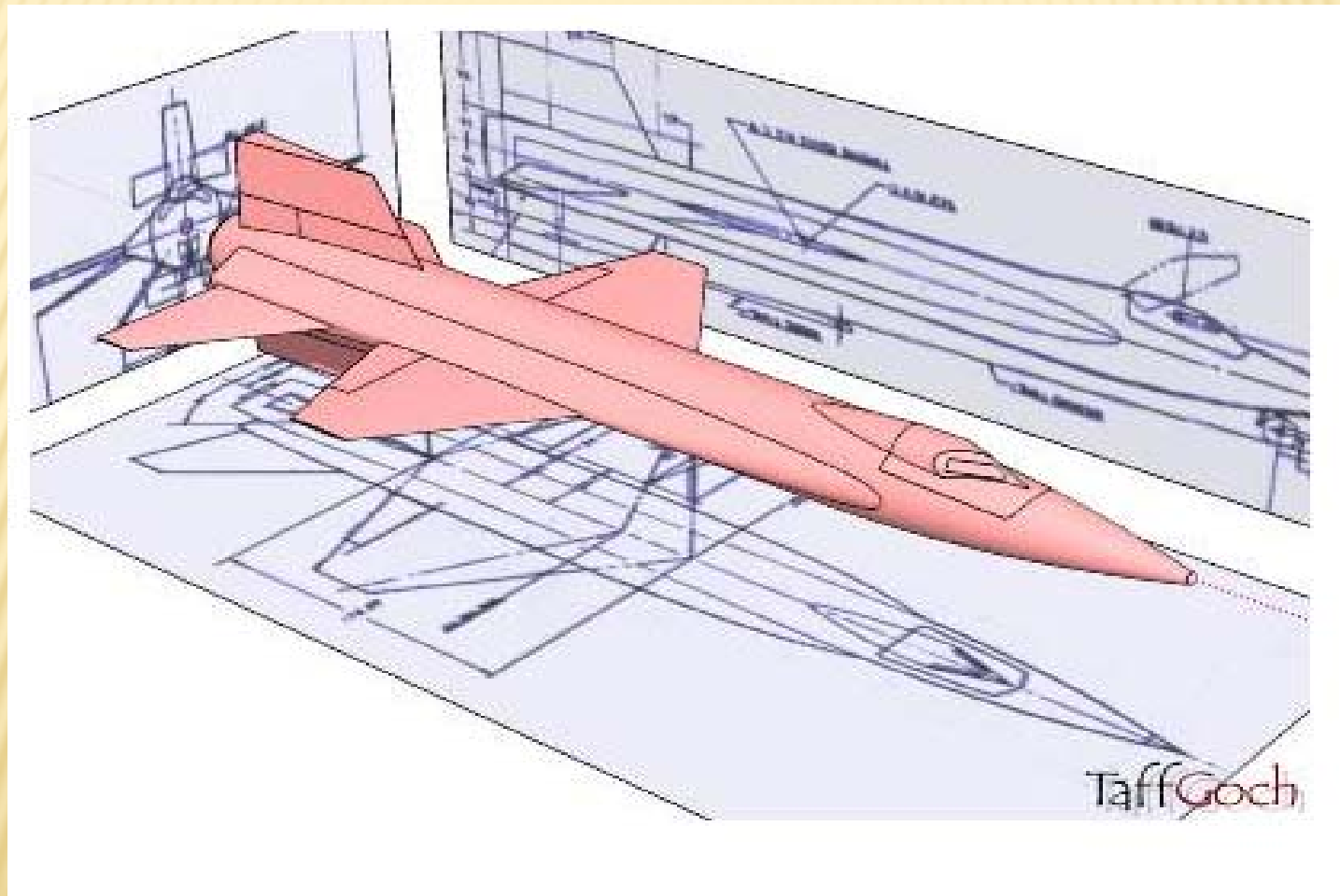
3 - VIEW DRAWING

3 - View drawings (Working Drawings) are an important part of the engineering process. As a rule, they show an object from three different views (Usually the Front, Top, & Right Side).

Each of the views are drawn in 2-D (two dimensional) and have dimensions labeling the length, width, and height of the object.

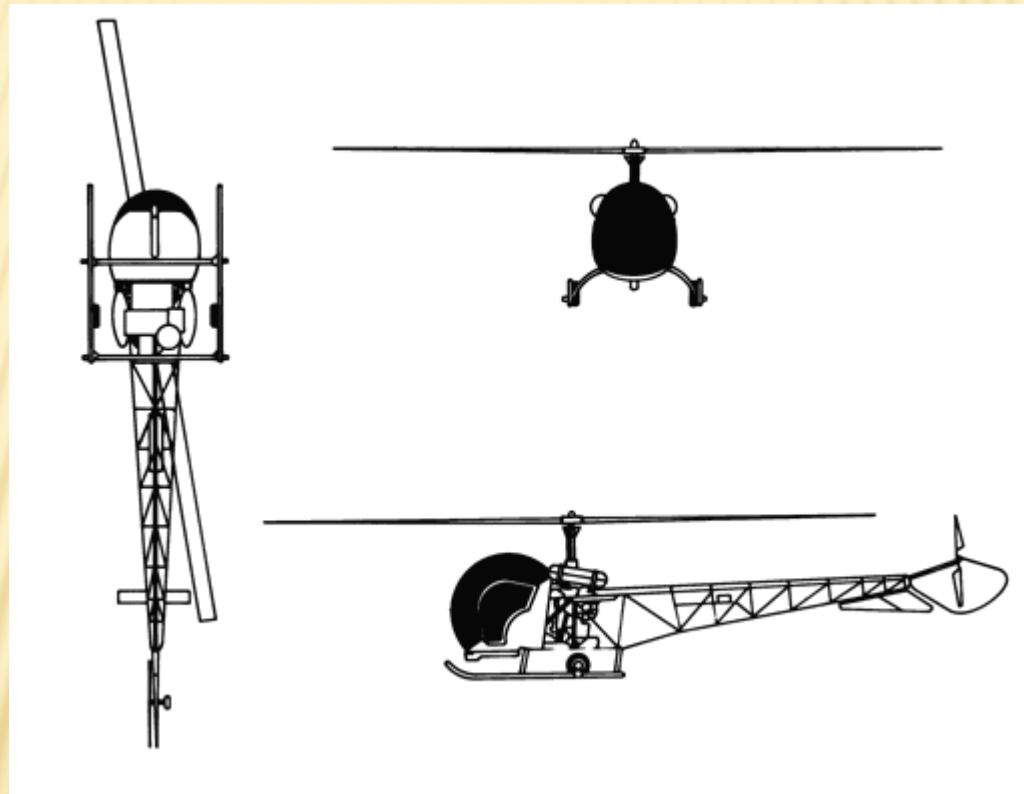


X-15

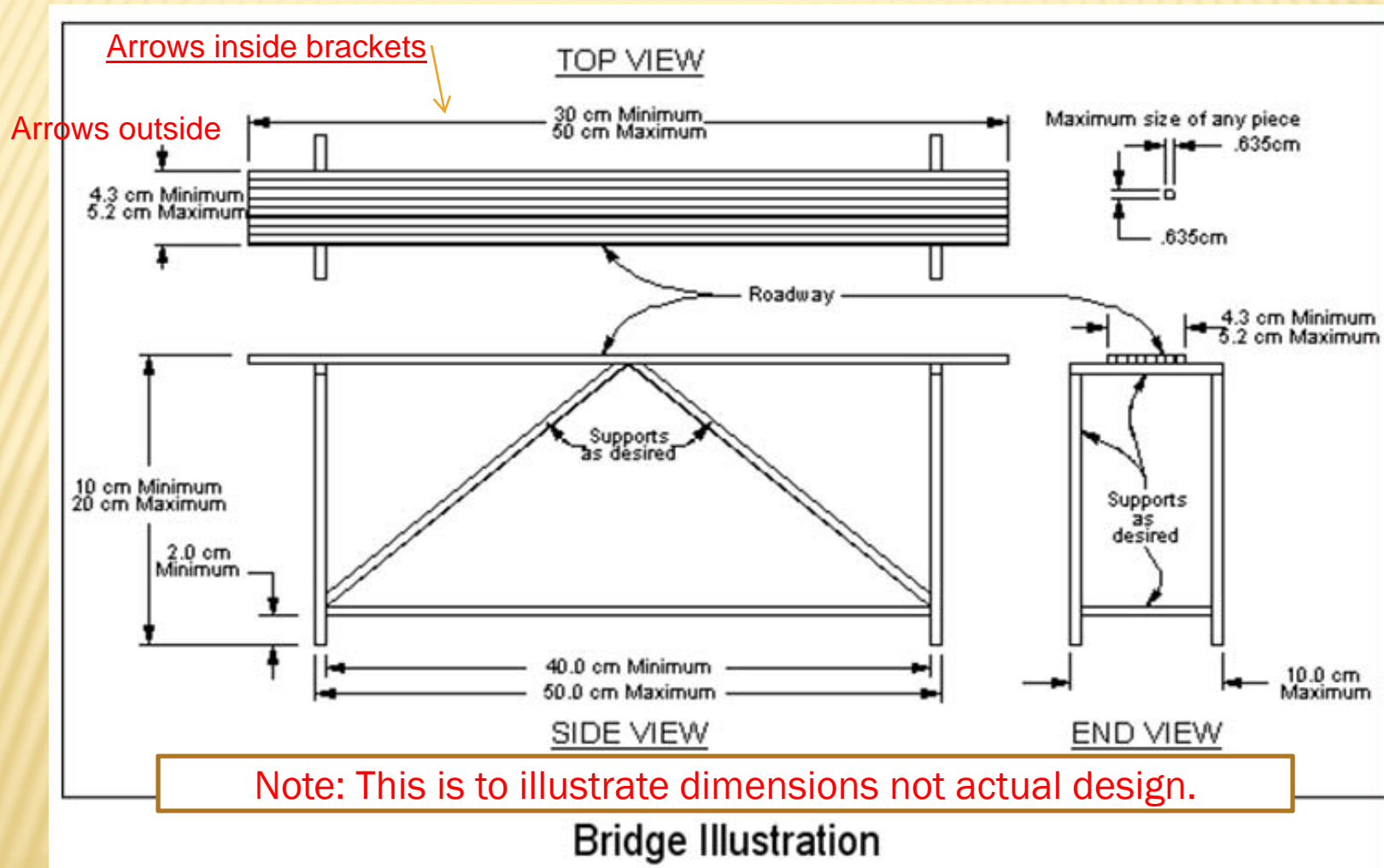


BELL 47

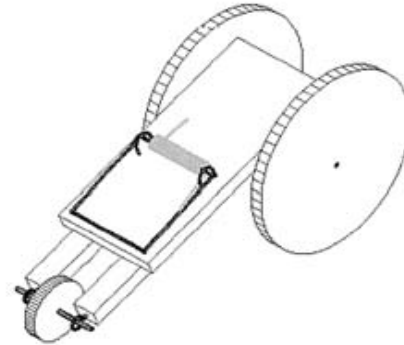
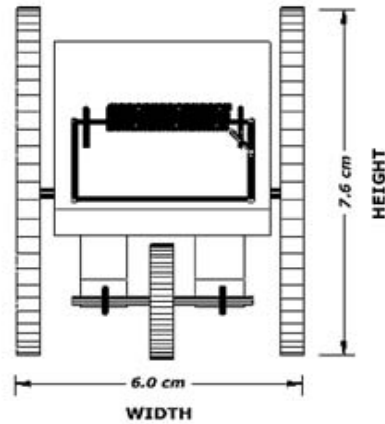
1946-1953



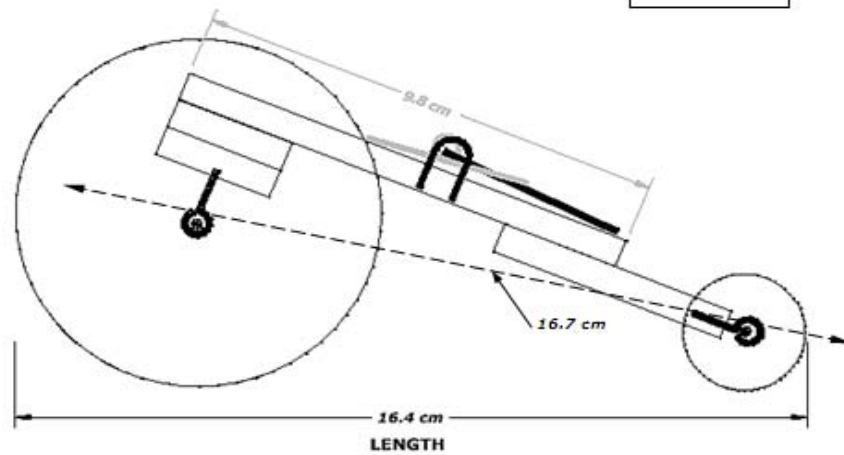
TECHNICAL DRAWINGS (3 VIEWS)



TECHNICAL DRAWING (3-VIEW)



SCALE
1.0:1.38



TITLE BLOCK

All Technical drawings are to include a Title Block

School Name:	
School Coordinator's Name:	
Team Name:	
Team Members' Names and Grades:	
Date of Competition:	Scale:

Be sure to check the size of paper.

Bridges & Water Rockets: 22" x 34" or 24" x 36

Mousetrap cars: 18" x 24"

TECHNICAL DRAWINGS (3-VIEW)

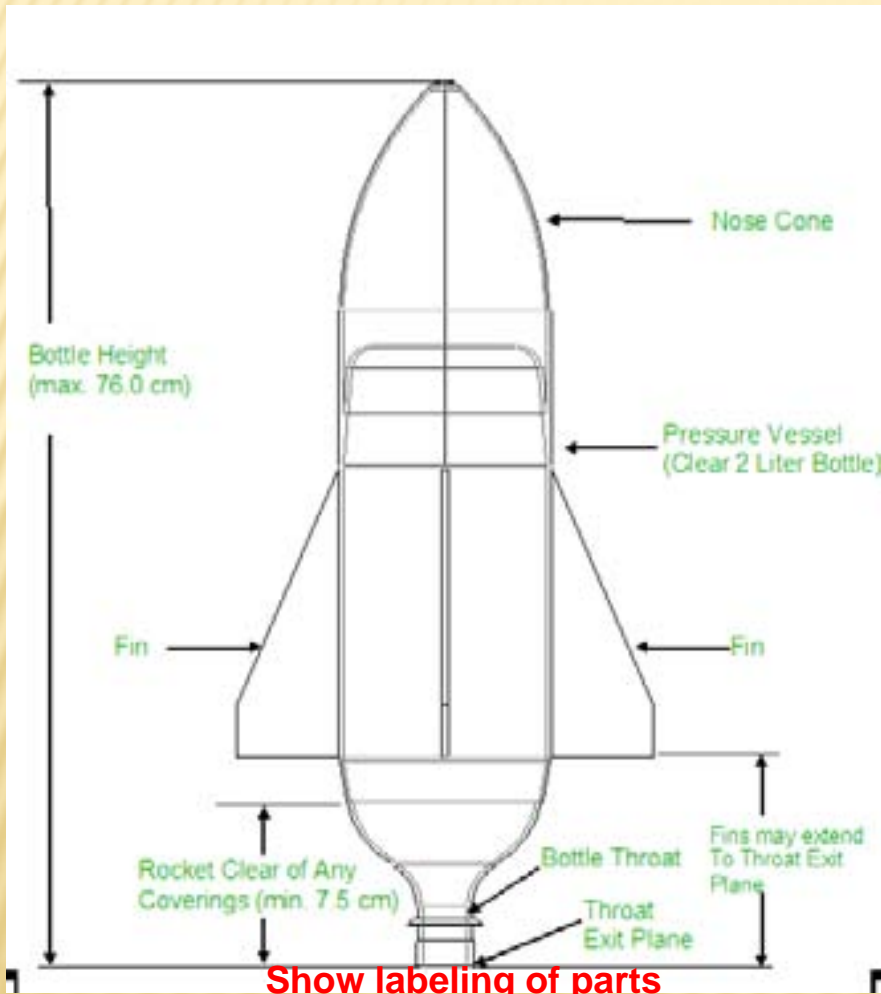
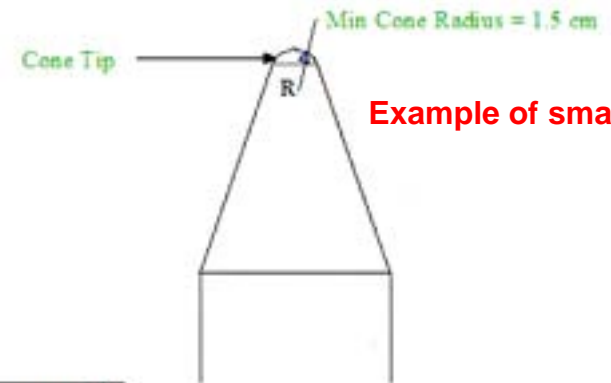


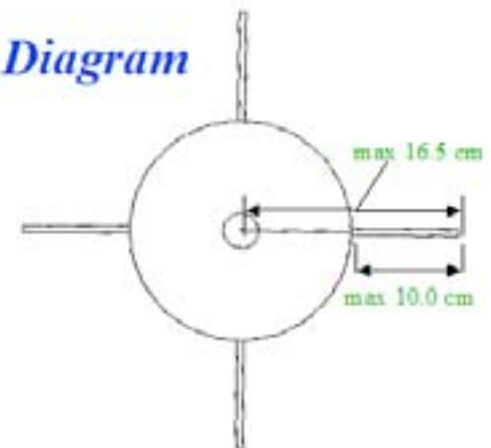
Diagram 2 *Nose Cone Diagram*



Example of small details

Diagram 3

Fin Diagram



TECHNICAL REPORTS

The single biggest complaint from judges / business partners is students are not completing each required section.

The next biggest complaint from judges is that the guidelines are not being followed as to: type of font, punctuation, grammar structure is poor, etc.

Your job as coordinator is to proof and guide your students in completing each section appropriately.

TECHNICAL REPORT (BRIDGES)

- ✘ As part of the design competition the team is required to write a Technical Report describing the design and construction of the bridge. **The Technical Report should be a computer printed or typed document on “8 x 11” white paper with one-inch borders at the top, bottom, and on each side. Font size is to be 12 point and the type is to be Times New Roman. Consider this the standard for ALL technical reports**
- ✘ The main body of the report, sections 4 through 6, should be a maximum of 5 pages total. Drawings, sketches, and tables may be included in an Appendix if desired, but this is optional and not required.
- ✘ While two (2) teams from each school may compete and to some extent their bridges may be similar, the two reports must be original and distinctly different. If not, then both teams will receive a score of zero.

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: (BRIDGES)

1. Cover Page containing:

- + Title of the Technical Report
- + School name and address
- + Name and grade of each team member (no home address required)
- + Team's name
- + School coordinator's name
- + Date of Competition

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: (BRIDGES)

2. Table of Contents (one page)
3. Introduction (History of Bridges*, designs, structures, etc. with citations)
4. Design (Philosophy of Design derived from the Introduction section**)
5. Construction Procedure
6. Description of Possible Failure Areas (a conclusion)
7. Bibliography
8. Appendix (optional)

The appendix may contain sketches, tables and charts not included in the five pages.

- ✘ * You may include, your school's bridge building , but concentrate on bridges from earliest times..
- ✘ ** Tell why you chose the bridge/truss design you implemented this year

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: (MOUSETRAP CARS)

1. Cover Page containing:

- + Title of the Technical Report
- + Name, Addresses and Grades of Team Members
- + Team's School Name and Address
- + School System Name
- + School Coordinator's Name
- + Date

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: (MOUSETRAP CARS)

- ✘ 2. Abstract: $\frac{1}{2}$ - 1 page summary
- ✘ 3. Table of Contents
- ✘ 4. Introduction
- ✘ 5. Design
- ✘ 6. Construction Procedures
- ✘ 7. Operation of the Mousetrap Car
- ✘ 8. Conclusion/Recommendations
- ✘ 9. Acknowledgements
- ✘ 10. Appendix (optional)

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: (MOUSETRAP CARS)

The Mousetrap Car Design Technical Report will be judged on:

- ✘ Outline
- ✘ Organization
- ✘ Precision
- ✘ Sentence Formation
- ✘ Mechanics

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: WATER ROCKETS

The team is required to write a Technical Report describing the design, construction and operation of the Water Rocket. Numbers, 1,2,3,4,5,7, and 8 are required to be presented together within a maximum of 8 pages. Add Pages as appropriate for numbers 6, and 9. Drawings, sketches, and table may be included in appendix.

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: WATER ROCKETS

1. Cover Page: includes

Title, Name and grade of team members, team's school name, coordinator, date

2. Abstract: $\frac{1}{2}$ -> 1 page

3. Table of Contents

4. Introduction

5. Design Background

6. Calculations: (see survival guide)

7. Conclusions / Recommendations

8. Acknowledgement / Reference

9. Appendix

TECHNICAL REPORT REQUIREMENTS AND GUIDELINES: WATER ROCKETS

The Water Bottle Rocket Design Technical Report will be judged on:

- ✘ Abstract
- ✘ Design Background
- ✘ Paper Structure
- ✘ Calculations
- ✘ Conclusion/Recommendations
- ✘ Grammar

ANY QUESTIONS????

- ✘ Let's look at some examples