

Engineering Fundamentals

ENG1100

Report Writing

Today's Agenda

- Report Writing
 - Sections
 - Format
 - Style
 - Incorporating & Discussing
 - Lists
 - Tables
 - Figures
 - Equations
 - Appendices
 - References

Technical Report Sections

(from Beer)

- Transmittal letter *
- Covers and label *
- Title Page
- Table of Contents
- List of Tables & Figures
- Executive Summary or Abstract *
- Introduction
- Body of the Report
- Conclusions
- References
- Appendixes

* Used for longer reports; not used in ENG1100

Technical Report Sections

- Title Page
 - Names, Title, Organization (Class, Section # & Team #) & Date
- Table of Contents Page
 - Major Section Titles#
 - Appendix Letter & Title
- List of Tables & Figures Page
 - Figure #: Title#
 - Table #: Title#

Examples

| Table of Contents | Page |
|-----------------------------------|------|
| – Introduction | 1 |
| – Launcher Design..... | 2 |
| – Launcher Evaluation | 3 |
| – Conclusions | 4 |
| – Appendix A: Cost Analysis | |
| – Appendix B: Preliminary Designs | |

| List of Tables & Figures | Page |
|--|------|
| – Figure 1: Preliminary Tests for Launcher | 3 |
| – Table 1: Bill of Materials and Cost Analysis | 3 |

Technical Report Sections

- Introduction
 - Problem Statement
 - Design Criteria & Constraints
 - System being analyzed
- Background:
 - Summary of launcher ideas (what it was, what worked & what did not work)
 - Properly cite references

Technical Report Sections

- Body (do not use "Body" as a Title)
 - Design Selection Process
 - Data collected
 - Description of Final Design
 - Testing and Design Evaluation
 - Good section to include required Table and Figure....
- Conclusion
 - Summarize findings
 - Recommendations to next year's students

Technical Report Sections

- References
 - Properly cited within text
 - Use library and internet
 - Personal communication references (if you talked to someone about previous designs)
- Appendices
 - Properly cited in text
 - Required:
 - See Report Guidelines
 - Not limited to just required ones

Technical Report Format

- Length: 4 pages or less (not including title page, table of contents or appendices)
- Line spacing: space and a half
- Font: 12 pt, Times New Roman or equivalent
- Margins: 1" on each side
- Electronic Page Numbers in lower right-hand corner
 - Insert -> Page Numbers
- Minimum of one table and one figure within the main document (properly labeled and cited)

Style and Audience

- Clear & Concise wording
 - Do not tell a story, "What I did for my design project."
- Write to a technical audience (instructor & other students)
- **Proof read your work more than once**
- See Beer, Chapter 3 for more on Style
- Review Active vs. Passive voice *Beer pg. 52-53*

Active vs Passive Voice

- Some instructors want Passive voice
 - Active voice directly states that someone does something.

Our ENG1100 instructor gave us a design project.

- Passive voice emphasizes the recipient of the action.

A snowball launcher design project was assigned.

Are the following sentences written in active or passive voice?

- 1) The report was written by the engineer.
- 2) Figure 5 shows a projectile launcher.
- 3) We determined the height of our projectile by using the laws of 2D motion and a ruler.

Are the following sentences written in active or passive voice?

- 1) The report was written by the engineer.
 - Passive
- 2) Figure 5 shows a projectile launcher.
 - Active
- 3) We determined the height of our projectile by using the laws of 2D motion and a ruler.
 - Active

Active vs. Passive

- **Active:** The engineer wrote the report.
- **Passive:** The report was written by the engineer.
- **Active:** Figure 5 shows a projectile launcher.
- **Passive:** The projectile launcher is found in Figure 5.
- **Active:** We determined the height of our projectile by using the laws of 2D motion and a ruler.
- **Passive:** The laws of 2D motion and a ruler were used to determine the projectile height.

Incorporating & Discussing

- Lists
- Tables
- Figures
- Equations
- Appendices
- References

Lists

- Stand out from rest of text
- Contain short phrases, sentences or paragraphs
- Start with same format
- Organize information
- Can be numbered or bulleted
 - Sometimes have sub-bullets (*like this*)

Tables

- Introduce Table before it appears in text
- Completely discuss Table before it appears in text
- Titled above Table
 - **Table 1:** Effect of Fuel Rate and Road Grade on Car Speed. (Car model = XLR, tire pressure = 30 psig, air temperature = 70°F, and air pressure = 0.985 atm.)
- Organized to make it easier to read
- Labeled including units
- See Beer, pg. 146-47

Example Table and Discussion

Experiments on an XLF were conducted to determine how car speed was affected by road grade and fuel rate. For these experiments a tire pressure of 30 psig was used. The air temperature and air pressure were 70°F and 0.985 atm respectively. For a full description of these experiments see Appendix A. The data from these experiments can be found in Table 1.

It can be seen that speed increases with increasing fuel rate.*(insert table here)*

Table 1: Effect of Fuel Rate and Road Grade on Car Speed. (Car model = XLF, Tire pressure = 30 psig, Air Temp. = 70°F, Air pressure = 0.985 atm)

| Road Grade (%) | Fuel Rate (gal/h) | Speed (mph) |
|----------------|-------------------|-------------|
| 0.00 | 1.00 | 38.2 |
| | 2.00 | 64.3 |
| | 3.00 | 81.0 |
| | 4.00 | 93.4 |
| | 5.00 | 99.2 |
| 5.00 | 1.00 | 32.2 |
| | 2.00 | 54.5 |
| | 3.00 | 68.4 |
| | 4.00 | 78.1 |
| | 5.00 | 84.8 |
| 10.00 | 1.00 | 25.8 |
| | 2.00 | 43.6 |
| | 3.00 | 54.7 |
| | 4.00 | 62.5 |
| | 5.00 | 67.8 |

Figures

- Introduce Figure before it appears in text
- Completely discuss Figure before it appears in text
- Titled below Figure (must include figure #)
 - **Figure 1:** Effect of Fuel Rate and Road Grade on Car Speed. (Car model = XLR, tire pressure = 30 psig, air temperature = 70°F, and air pressure = 0.985 atm.)
- Explained fully in text
- Used to visualize what is written
- See Beer, pg. 140-46

Example Figure and Discussion

Figure 1 is a graphical display of this data. It shows that the increase in speed with respect to fuel rate is non-linear. In addition, as road grade increases the speed decreases. At a rate of 1 gal/h there is approximately a 5 mph decrease, while at 5 gal/h there is approximately a 15 mph decrease in speed. (insert Figure)

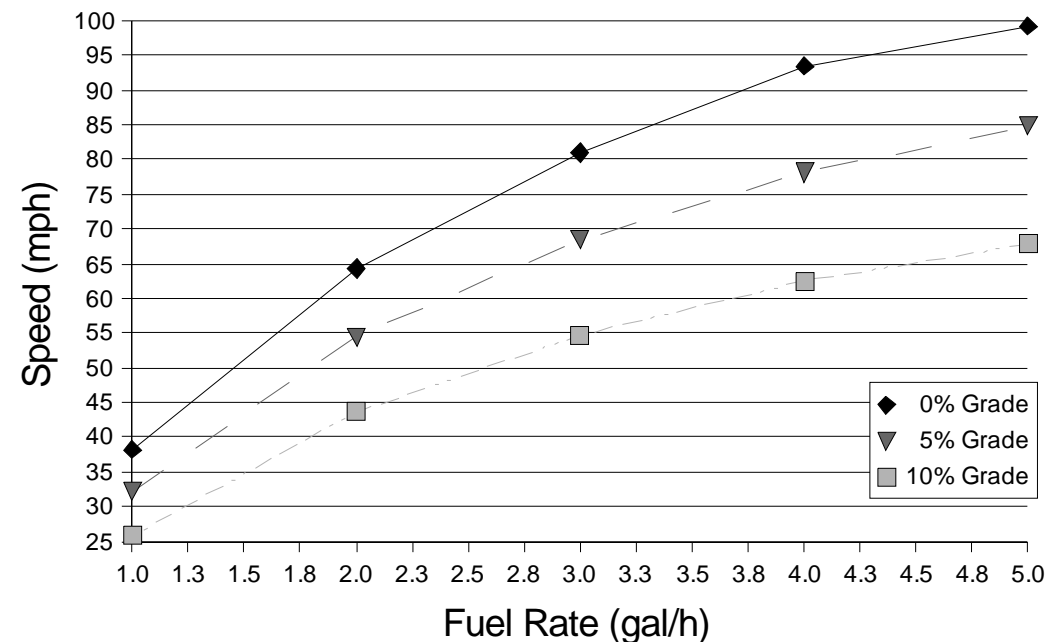


Figure 1: Effect of Fuel Rate and Road Grade on Car Speed. (Car model = XLF, Tire pressure = 30 psig, Air Temperature = 70°F, Air pressure = 0.985 atm)

FYI - Equations

- Numbered
- Incorporate in text
- See Beer, pg. 65-66

Equation 1 is the quadratic equation. Two methods can be used to solve this equation: the method of factoring or the quadratic formula (equation 2).

$$0 = ax^2 + bx + c \quad (1)$$

where

x = variable (units)

a = constant (1/units²)

b = constant (1/units)

c = unitless constant

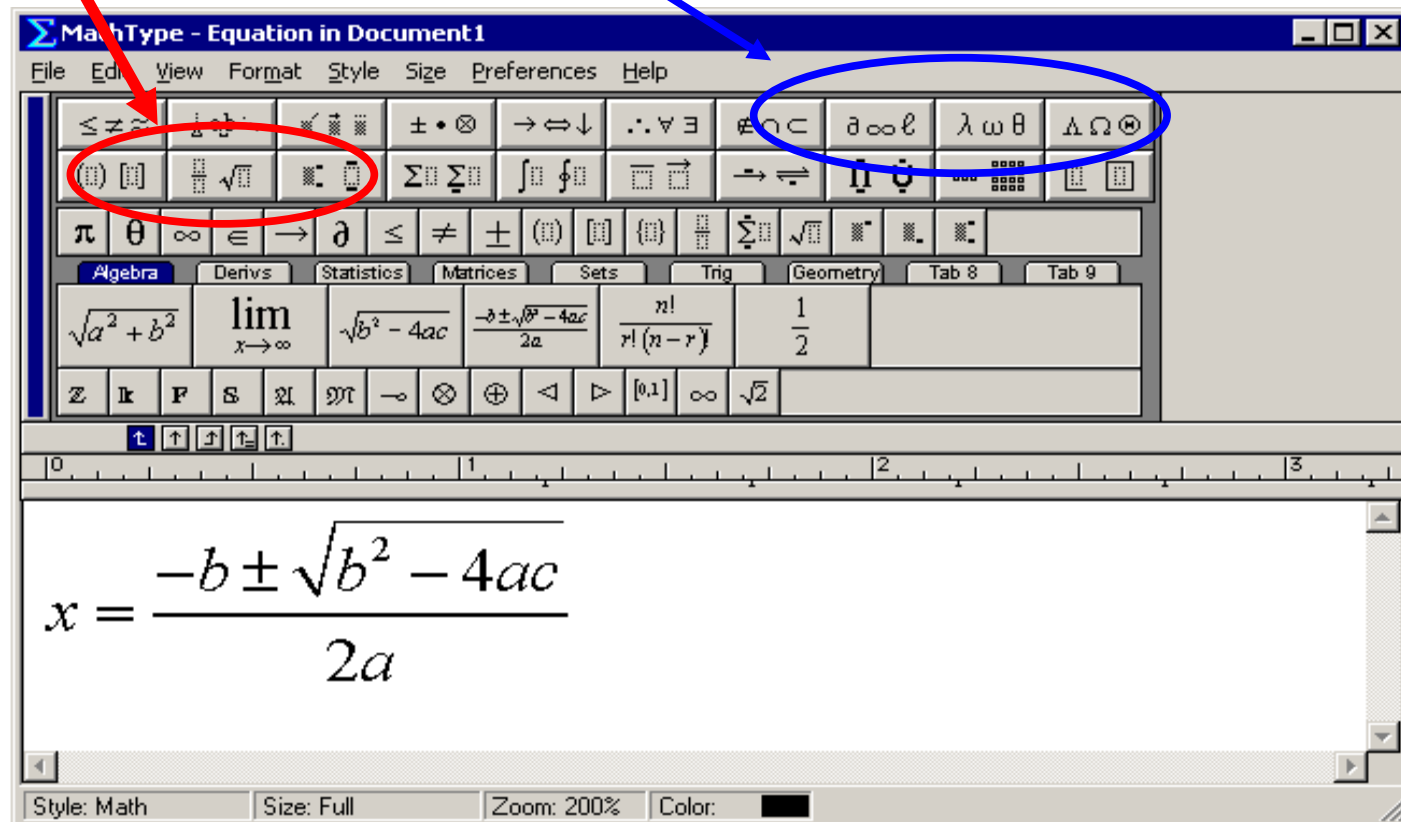
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (2)$$

FYI - Equations in MS Word

- Insert \Rightarrow Object \Rightarrow Microsoft Equation 3.0
- Use Equation Icons

Symbols (i.e., π θ α ...)

- File \rightarrow
Update
Document

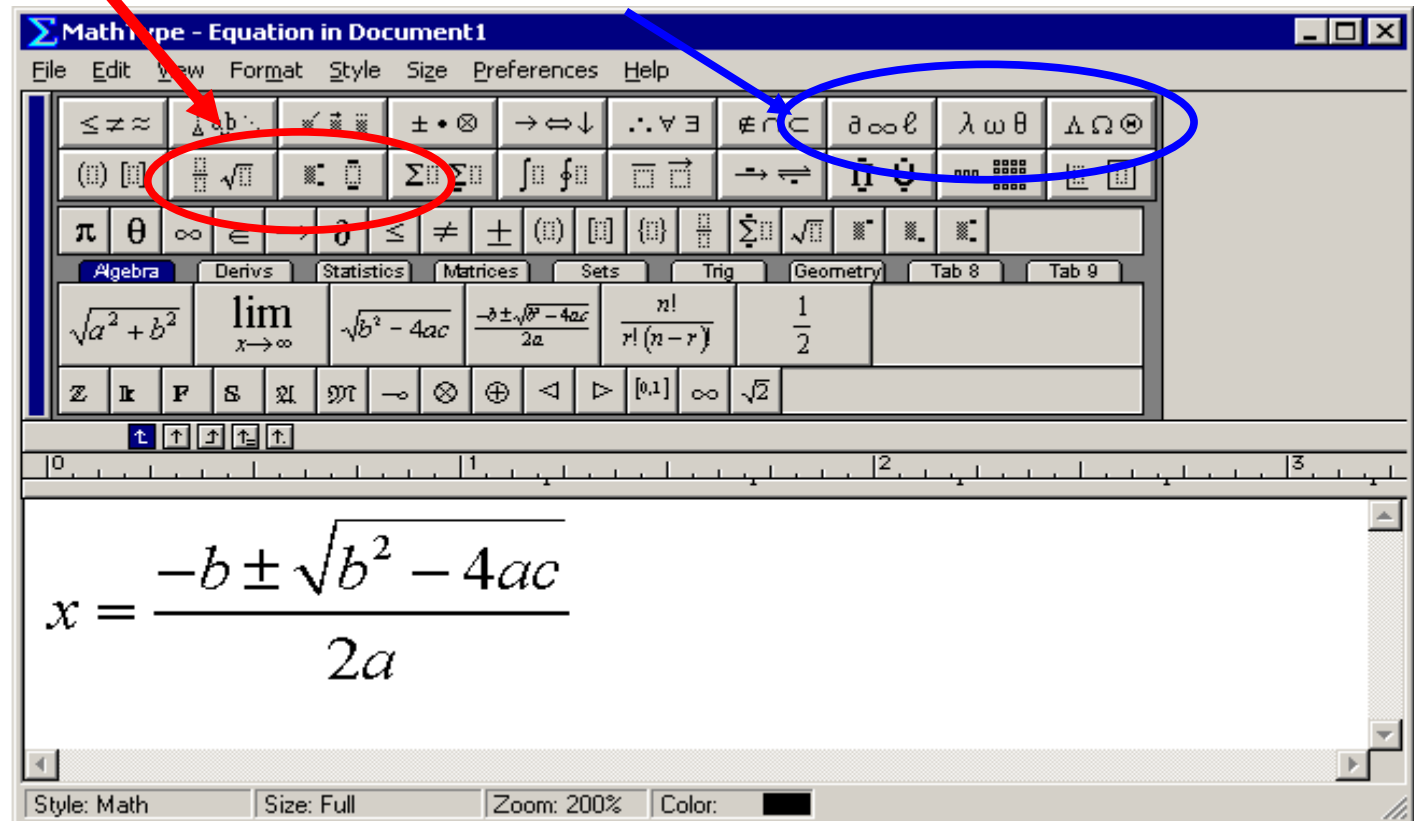


FYI – As a Team...

- Use MS Word to write $\Rightarrow V = \frac{4}{3} \pi r^3$ Volume of a sphere
- Insert \Rightarrow Object \Rightarrow Microsoft Equation 3.0
- Use Equation Icons

Symbols (i.e., π θ α ...)

- File ->
Update
Document



References

aka: Borrowed Information, Documentation, Bibliography, Citations

- Tells reader where s/he can find information
- Gives credit to earlier research
- Protects you from plagiarism
- Shows reader you have researched information
- Can be used to validate your work
- Found in sentence that contains borrowed info
- Two typical forms: Number or Name & Year

References: Number Format

(Beer, pg 149-152 or www.ece.uiuc.edu/pubs/ref_guides/ieee.html)

Fuel consumption was the major [1]. Other studies have shown that [1,2]. In addition, as road grade increased, fuel consumption [3:112-120].

References

[1] L.J. Fritz, "Fuel consumption of a Ford Escort," *Science News*, vol. 183 pp. 38-42, Feb. 25, 1995.

[2] M. Brass,

[3] "Road Grade," *Encyclopedia Britannica*, 1976, ed.

[4]

References: Name & Year Format

(see cal.bemidji.msus.edu/WRC/Handouts/APAFormat.html)

Speed was found to decrease..... (Fritz, et. al, 1997). Fuel consumption was the major (Brass, 1982; Williams, 1978). Fritz (1989) has shown that ...

References

Brass, M., (1982). Road Grade's Effect on Fuel Consumption, *Auto Report*, 23, 132-145.

Fritz, L.J. & Brass, M., (1989). Fuel consumption of a Ford Escort, *Science News*, 20, 38-42.

Fritz, L.J., Johnson, A.T., & Turner, G.L., (1997). ...

Williams, M.T.,

Appendix

- Label using letter and title at TOP of page
 - **APPENDIX A:** Experimental Procedure for Determining Speed of Vehicle
 - **APPENDIX B:** Raw Data from Speed Testing
- First appendix cited in text is always Appendix A
- New documents should be in the next appendix
- Figures, Tables, etc. in Appendix should be numbered
 - Many times figures in appendix are labeled with letter
 - i.e. Figures in Appendix A are labeled Figure 1A: *Title*
- See Beer, pg. 148-49

Example Appendix and Discussion

For these experiments a tire pressure of 30 psig was used. The air temperature and air pressure were 70°F and 0.985 atm respectively. For a full description of these experiments see Appendix A. The data from these experiments can be found in Table 1. It can be seen that speed increases with increasing fuel rate. Appendix B contains the raw data collected from these experiments.

APPENDIX A: Experimental procedure for determining vehicle speed while changing road grade and fuel rate.

Test Site:

Equipment:

Procedure:

Data Collection: