

# WELCOME BACK!



**ENGINEERING  
TECHNICAL  
COMMUNICATIONS**  
**WEEK #7**  
**LESSON 1**

**PRISMACOLOR®**  
Plastic Eraser  
Gomme en plastique





*Announcements*

# Why Connect?

Connect is your personalized digital learning platform that makes studying and getting work done easier and more convenient than ever.



Maximize your study time with a personalized learning path.



Achieve better grades & track your progress.



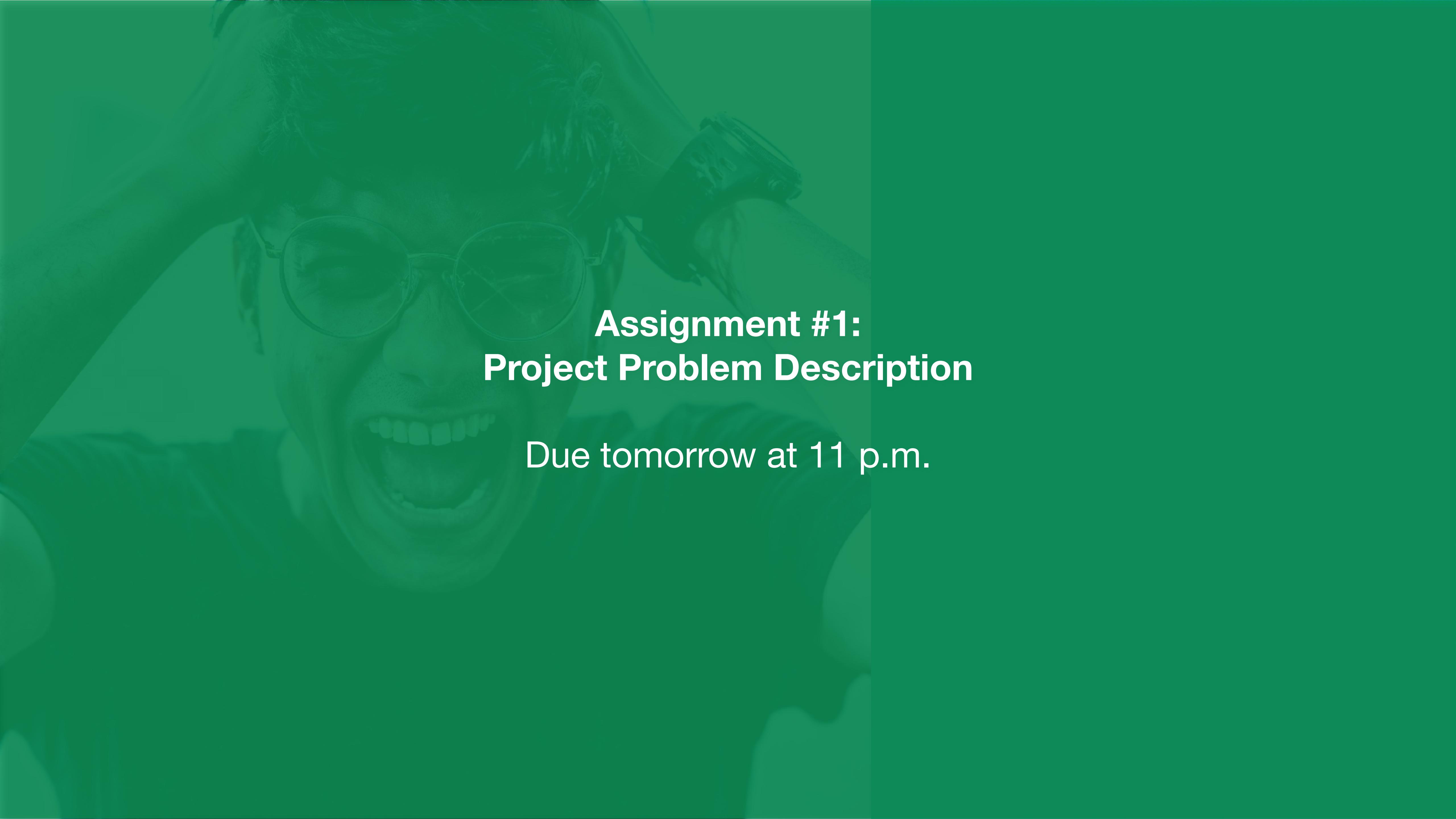
Save time – access assignments & learning tools in one place.



Learn online or offline, anytime, anywhere.

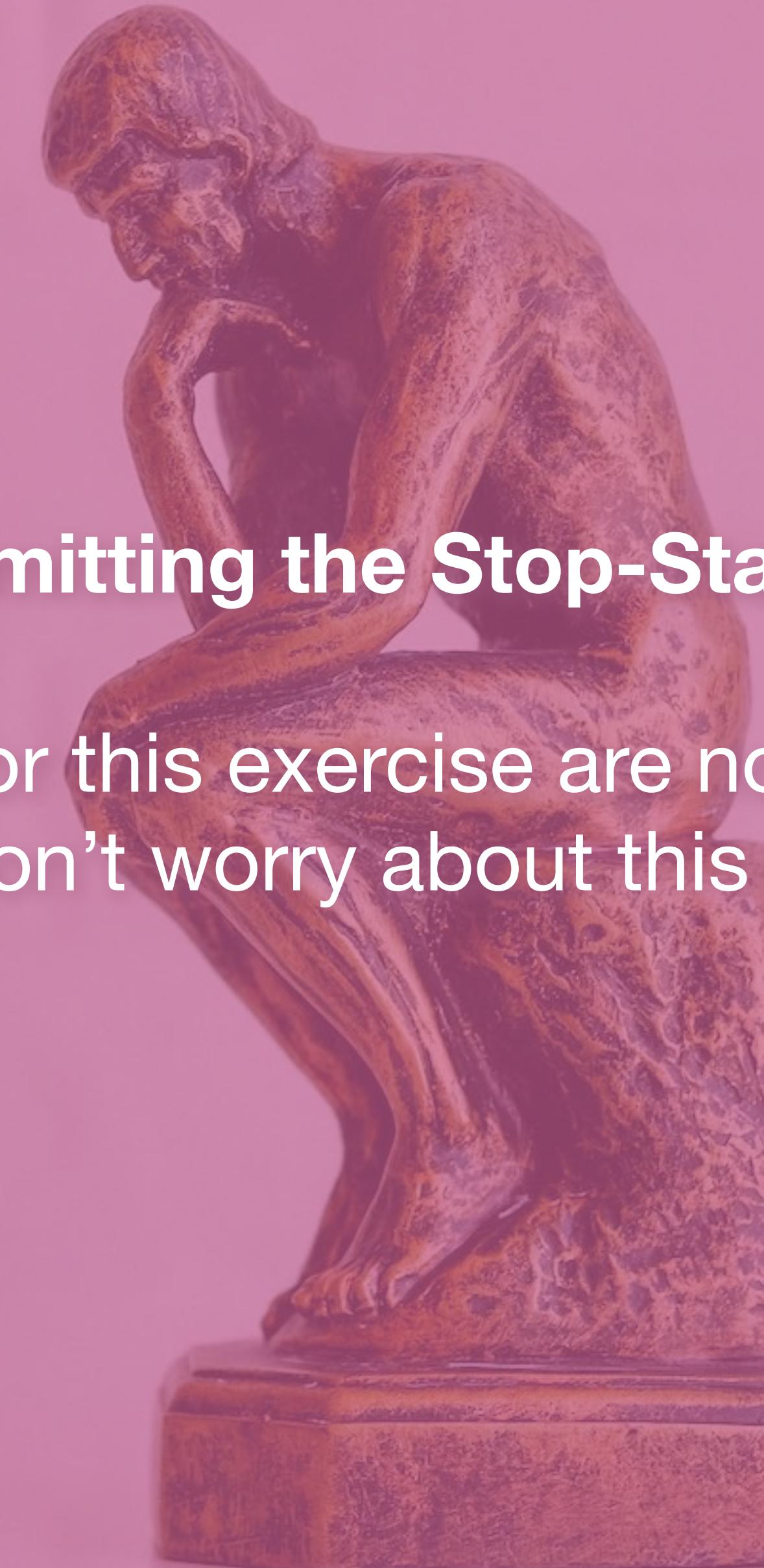
## Connect is over! You should be able to see your grade now.



A black and white photograph of a person from the chest up. They are wearing round-rimmed glasses and a light-colored face mask. A laptop is open and resting on their lap. They are smiling broadly, showing their teeth. The background is slightly blurred.

## **Assignment #1: Project Problem Description**

Due tomorrow at 11 p.m.



**Thank you for submitting the Stop-Start-Continue survey.**

Your grades for this exercise are not yet available.  
Please don't worry about this right now.



**Next week is Reading Week!**



RECAP

# LAST CLASS

- Review: In-Class Exercise #3
- Writing Technical Paragraphs
- Prompt: Stop-Start-Continue Survey

## Today:

- Prompts: Assignments #3a and 3b
- Technical Graphics
- Technical Graphics Kahoot Quiz

A photograph of a person from behind, sitting on a rocky outcrop. They are wearing a dark jacket and light-colored pants. The person is looking out over a vast, rolling landscape covered in low-hanging clouds or fog. The sky above is a bright, hazy yellow, suggesting either sunrise or sunset. In the foreground, there are some low-lying plants and rocks.

# **Assignment #3a (Team): Team Project Overview**

## **Assignment #3a (Team): Project Overview**

In this team assignment, you will provide a concise, clearly defined overview of the solution your group proposes to the problem you identified in Assignment #1. An overview is a general summary or outline of a larger, more complex project.

You and your project team members will each use this overview as a basis for further, specific analysis, considering one of the four “smart design” lenses, in the Individual Analysis Report assignment (Assignment #3b).

This Project Overview document should include the following elements:

- An original, descriptive title that clearly identifies the general concept of your project
- A concise description of the problem your project aims to solve, identifying the existing consumer product that contributes to that problem
- A concise description of your team’s solution to this problem, including the specific improvement/modification you propose to make to the product you have identified
- The specific geographical scope of your project, including a brief rationale (i.e., a concise explanation of *why* you chose to limit your project to this scope)
- The specific United Nations Sustainable Development Goals your project addresses, including a brief explanation of how the project addresses them

## **Objectives**

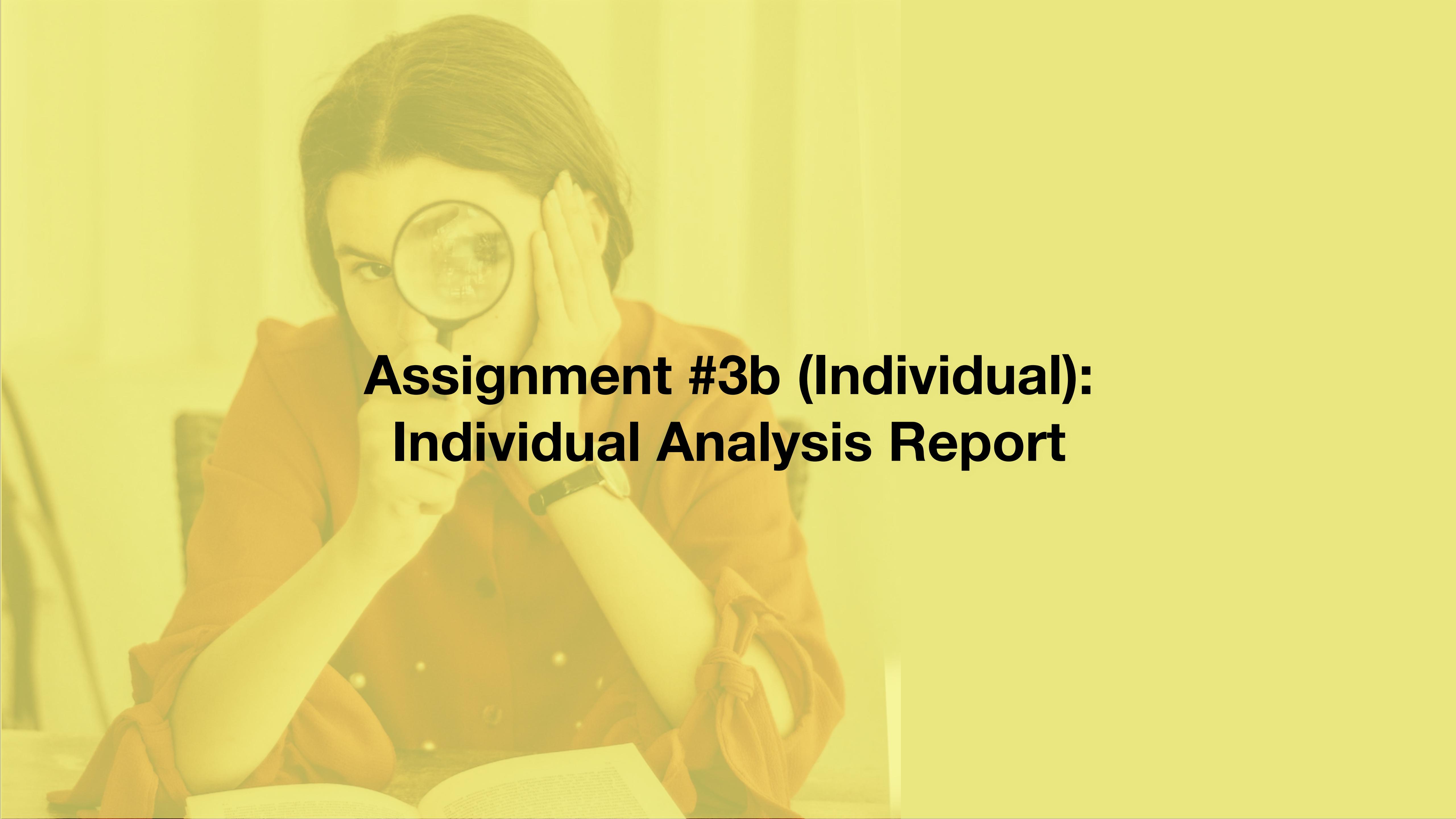
- To define a limited, appropriate focus for an ongoing project to support future analysis
- To clearly and concisely summarize the details of a larger project in a relatively short document, thereby demonstrating an appreciation for your audience's time and capacity for attention
- To strengthen your ethos as a team of responsible and knowledgeable writers by illustrating your familiarity with the issues involved in a complex but solvable problem, making appropriate references to credible outside research

## **Formatting and Specifications**

- The document should be between 300 and 500 words long. It must fit on a single page. The length of this assignment does not depend on the number of students in your project team.
- The document must be written in complete, grammatically correct sentences, organized appropriately into paragraphs. Leave a 12-point space between paragraphs, as discussed in class.
- The document must use a 12pt Times New Roman font with standard 1-inch (2.5 cm) margins.
- This document does not require and should not contain visual elements or figures.
- The page/word limit does not include your reference list. This document does not require and should not contain appendices.
- There is no template or outline for this assignment. You are responsible for making decisions about formatting and organization based on the information you have received in this course.
- All in-text citations and references must correctly follow IEEE Style guidelines.
  - Uncited or incorrectly cited and referenced sources may be treated as plagiarism.
  - See the modules on Information Literacy and Referencing for more information on correctly citing sources.

### **Due Date and Assessment**

- **Due Date:** Friday, March 10, 2023, at 11:59 p.m. on Brightspace (only one member per team needs to submit the assignment)
- **Weight:** 5% of final grade



# **Assignment #3b (Individual): Individual Analysis Report**

## **Final Project Assignment #3b (Individual): Individual Analysis Report**

In this individual assignment, you will analyze the solution your group proposes to the problem you identified in Assignment #1 by writing a report that focusses on your solution through a specific “Smart Design” lens. Each group of four students\* must analyze their proposed solution in terms of the four aspects of the Smart Design model:

- Business
- Human
- Technology
- Nature

*Note: If you are in a group of three students, you must analyze your solution through the Human, Technology, and Nature lenses.*

For this assignment, please coordinate with your group members to ensure each student analyzes the solution through a different lens. Each part of this assignment (i.e., each lens) must be connected. The goal with Smart Design is to ensure a holistic and fulsome analysis of a design. See the “Final Project Planning - Introduction to the Smart Design Lenses” document for further explanation of the Smart Design model.

The report should provide a detailed analysis of your proposed solution in terms of your chosen Smart Design lens. The report should only address the one lens of the Smart Design model on which you are working.

### **Objectives:**

- To demonstrate your ability to apply credible research to the problem (logos)
- To strengthen your ethos as a responsible and knowledgeable writer by illustrating your familiarity with the issues involved in providing your solution to the problem (ethos)
- To show empathy for perceived stakeholders and to address concerns that could arise from your proposed solution (pathos)

### **Formatting and Specifications:**

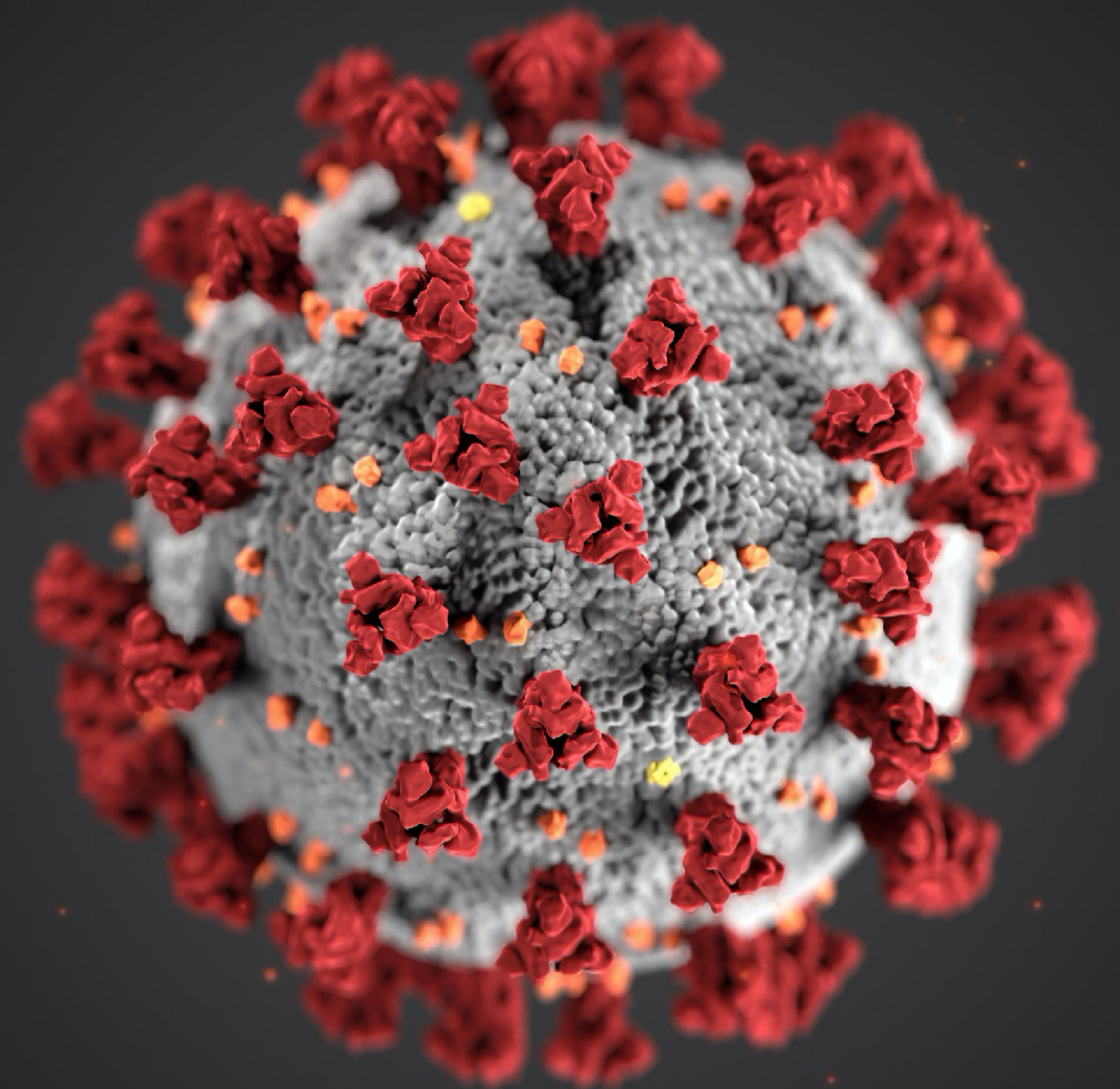
- The document should be a maximum of 500 words (around one page).
- The document must include at least one visual element (figure or table) with proper label, title or caption, reference, and mention of the figure in the text.
- The word limit does not include your visual elements, reference list, or appendices.
- The document must be written in complete, grammatically correct sentences, organized appropriately into paragraphs. Leave a 12-point space between paragraphs, as discussed in class.
- The document must use a 12pt Times New Roman font with standard 1-inch (2.5 cm) margins.
- All in-text citations and references must correctly follow IEEE Style guidelines
  - Uncited or incorrectly cited and referenced sources may be treated as plagiarism.
  - See the modules on Information Literacy and Referencing for more information on correctly citing sources

**Due Date and Weight**

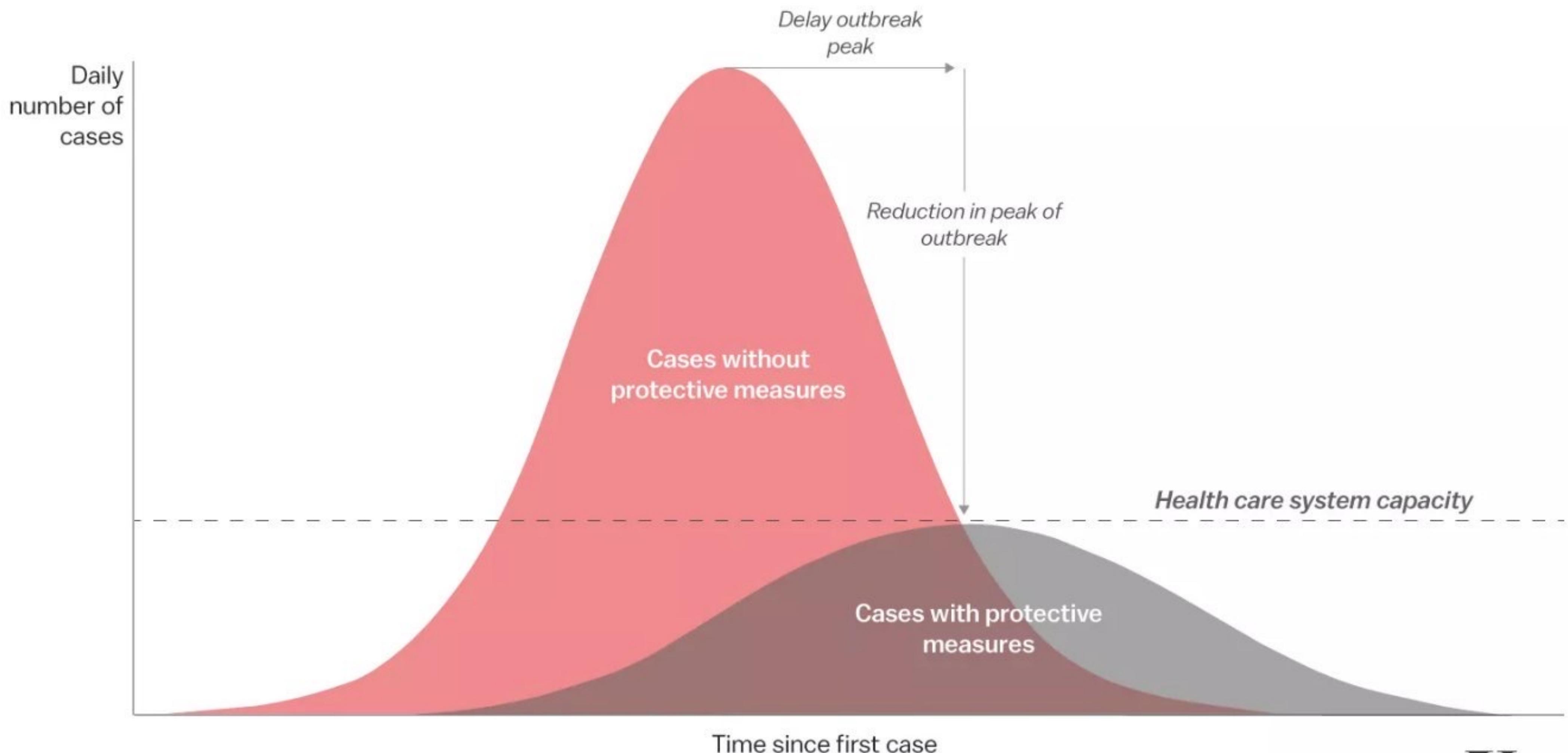
**Due Date:** Friday, March 10, 2023, at 11:59 p.m. on Brightspace

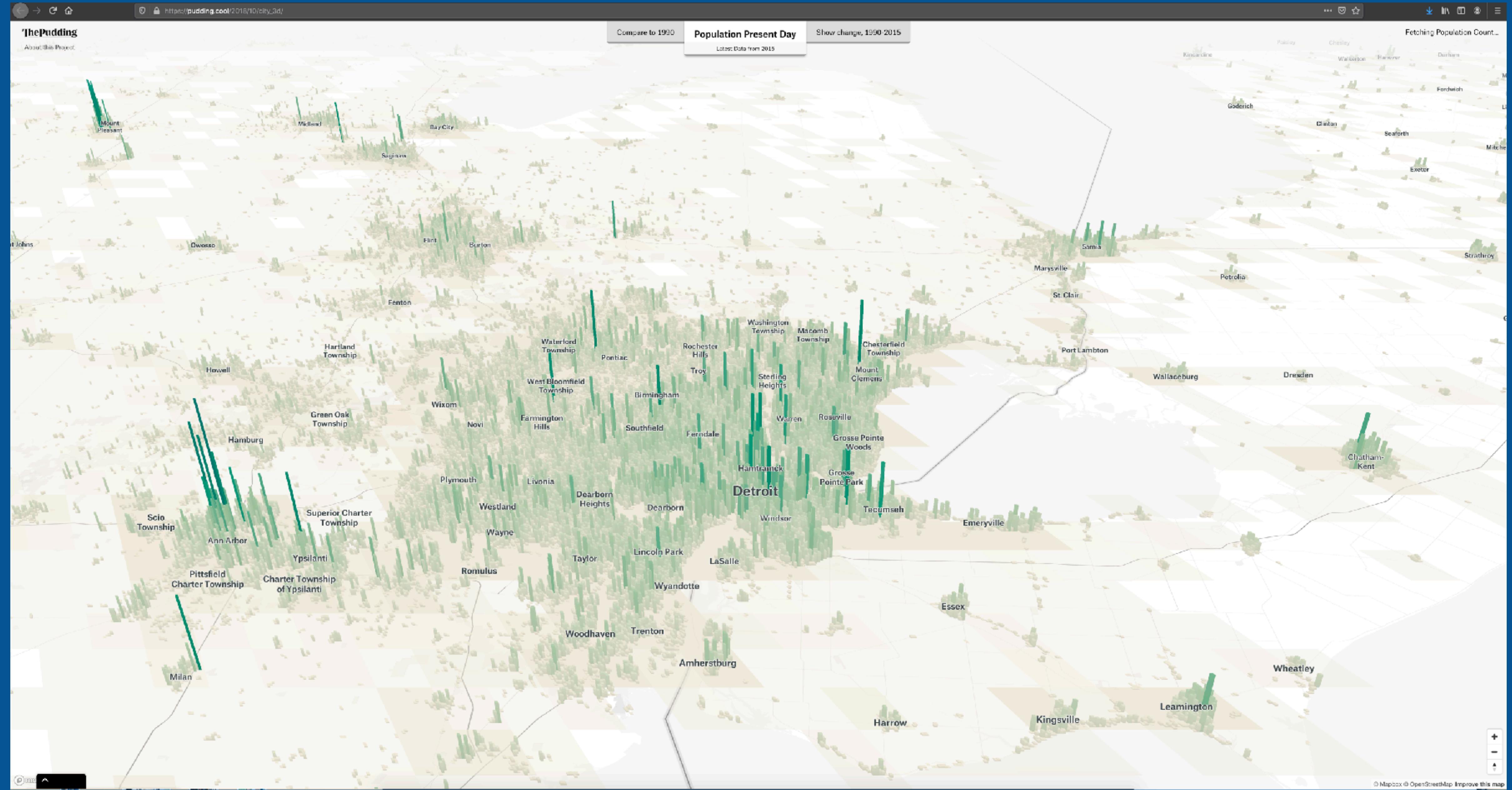
**Weight:** 10% of final grade

# **TECHNICAL GRAPHICS**



# Flattening the curve







VISUALS

# WHY VISUALS MATTER

- Visuals make data easier to interpret and remember.
- Visuals reveal meanings that might otherwise remain buried in lists of facts and figures.
- Visuals shape and enhance information so that the message is understandable at a glance.

# WHEN TO USE VISUALS

- Whenever they can make your point more clearly than text or when they can enhance your text.
- To clarify and support your discussion, not just to decorate your document.
- To direct the audience's focus or help them remember something.

# When to Use Visuals: Examples

- The thirteen aisles are broken into eleven aisles that consist of two rows each and two horizontal aisles.
- The time required for global population to grow from 5 to 6 billion was shorter than the interval between any of the previous billions. It took just 12 years for this to occur, just slightly less than the 13 years between the fourth and fifth billion, but much less time than the 118 years between the first and second billion...[1]



# HOW TO CHOOSE THE RIGHT VISUALS

- Who is my **audience** for these visuals?
- What is the **purpose** for using this visual?
- What **form** of information will best achieve my purpose for this audience?

# TYPES OF VISUALS TO CONSIDER

Visuals come in four categories:

1. **Tables:** Display organized data across columns and rows for easy comparison.
2. **Graphs:** Translate numbers into shapes, shades, and patterns.
3. **Charts:** Depict relationships via arrows, lines, and other design elements.
4. **Graphic Illustrations:** Rely on pictures rather than on data or words.

# TABLES



## Energy supply and demand

	2005	2006	2007	2008	2009
petajoules					
<b>Primary production<sup>1</sup></b>	<b>16,489.9</b>	<b>16,815.5</b>	<b>17,147.9</b>	<b>16,380.0</b>	<b>15,325.6</b>
Exports <sup>1</sup>	8,662.2	8,898.6	9,331.0	9,301.6	7,902.0
Imports <sup>1</sup>	3,139.2	2,977.4	3,124.1	3,010.4	2,944.8
Energy availability <sup>1</sup>	11,307.1	11,176.9	11,969.1	11,179.1	10,962.9
<b>Net supply<sup>2</sup></b>	<b>9,946.1</b>	<b>9,879.6</b>	<b>10,405.8</b>	<b>10,160.3</b>	<b>9,832.0</b>
Producer consumption	1,274.0	1,282.3	1,363.9	1,338.3	1,277.5
Non-energy use	983.7	1,044.9	1,083.7	1,012.1	902.3
<b>Energy use, final demand</b>	<b>7,688.5</b>	<b>7,552.4</b>	<b>7,958.4</b>	<b>7,802.3</b>	<b>7,649.8</b>
Total industrial	2,312.8	2,314.0	2,450.7	2,280.2	2,244.7
Total transportation	2,388.8	2,372.3	2,484.0	2,429.2	2,396.3
Agriculture	208.5	211.4	215.6	217.7	190.0
Residential	1,296.6	1,243.4	1,336.5	1,356.3	1,316.2
Public administration	136.1	127.6	122.1	122.5	121.8
Commercial and other institutional	1,346.1	1,283.8	1,349.7	1,396.4	1,380.8

1. Primary energy sources are coal, crude oil, natural gas, natural gas liquids, hydro and nuclear electricity.

2. Net supply of primary and secondary sources.

**Source:** Statistics Canada, CANSIM, table [128-0009](#) and Catalogue no. [57-003-X](#).

Last modified: 2011-04-18.

[Find information](#) related to this table (CANSIM table(s); Definitions, data sources and methods; *The Daily*; publications; and related Summary tables).



# TABLES

- Present information not in sentence syntax, but in a visual syntax
- Align information in a matrix of columns and rows for easy reference
- Provide information in easily accessible tabular form when it cannot be clearly expressed in sentence form

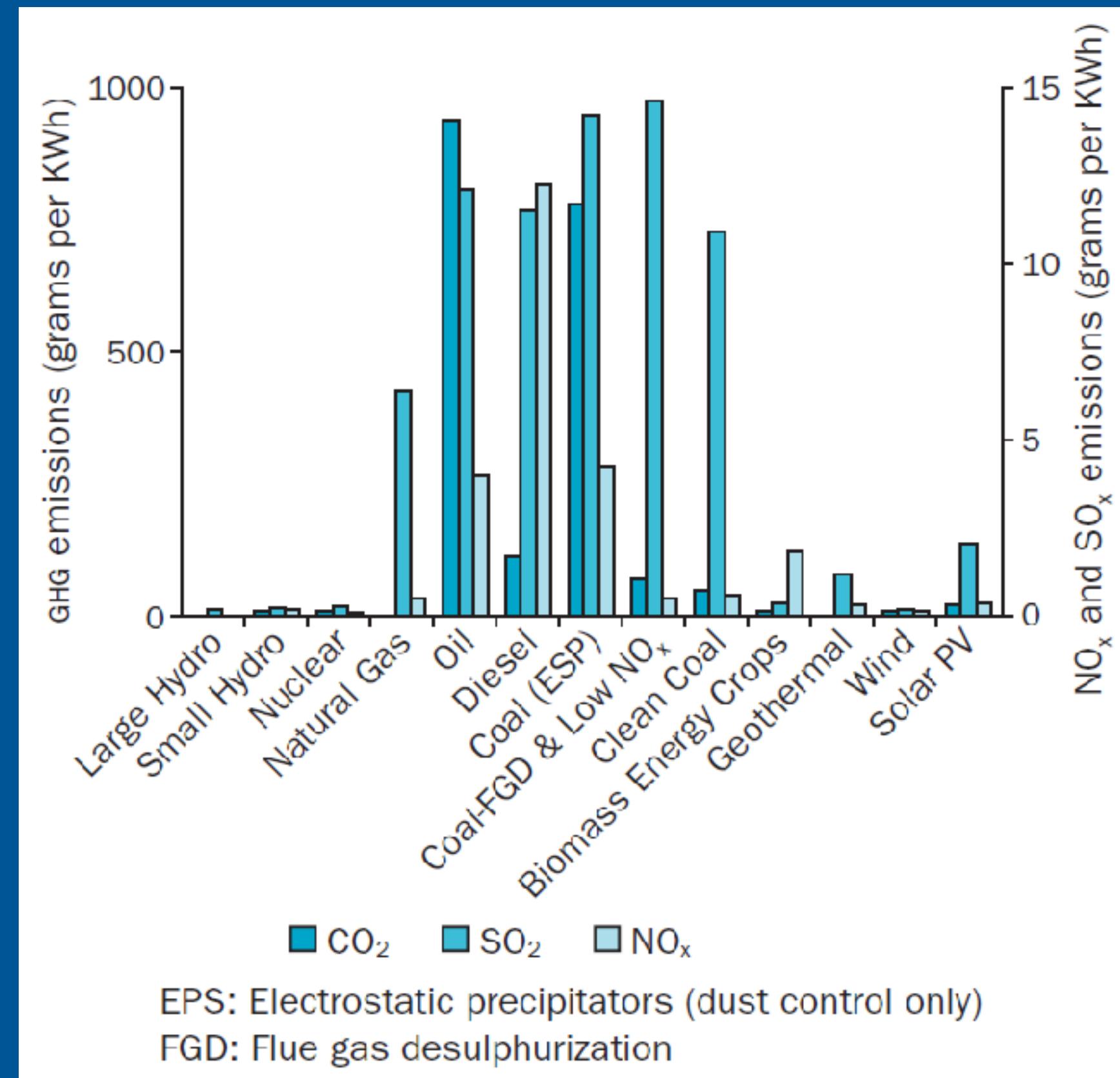
# GRAPHS



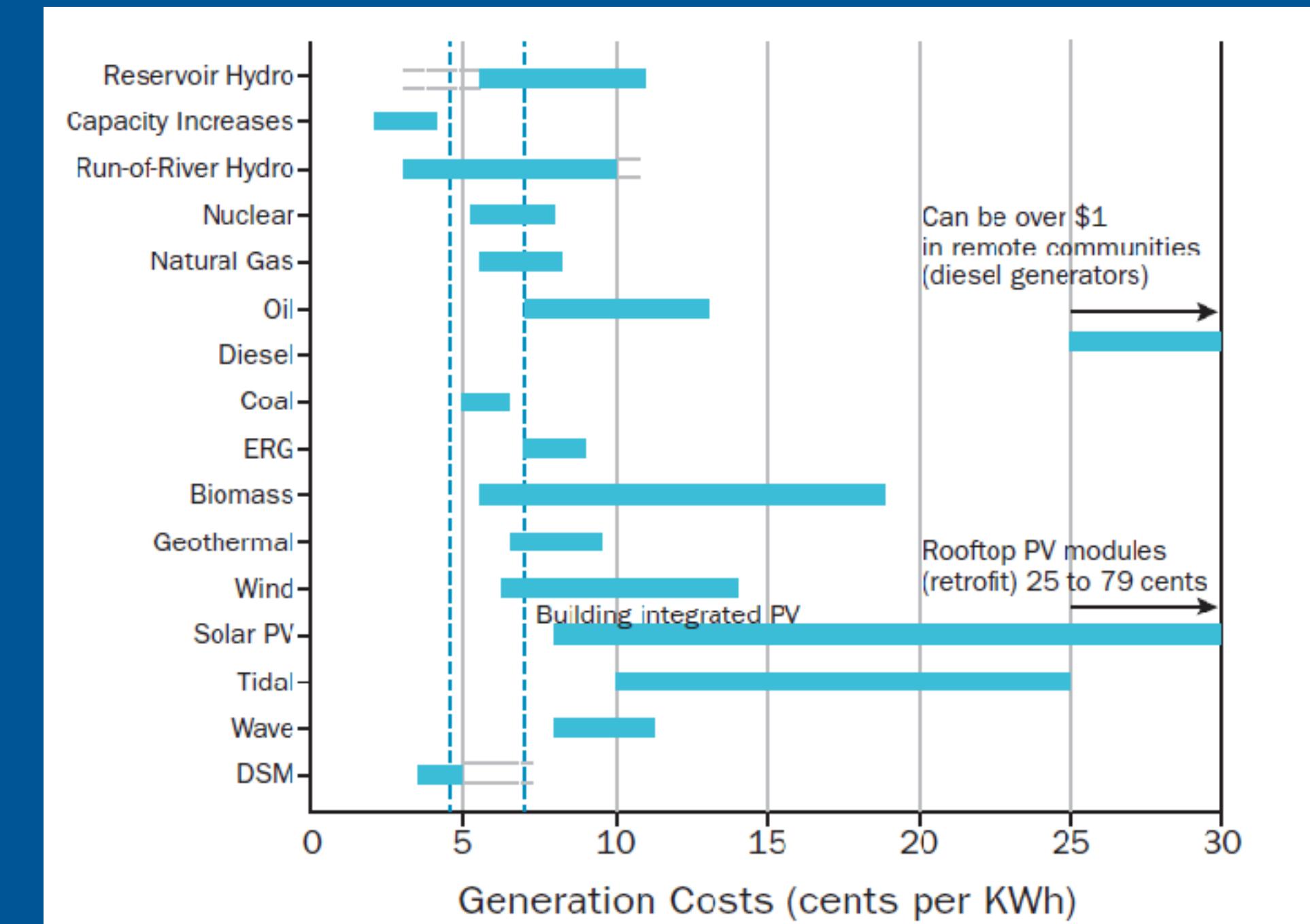
# BAR/COLUMN GRAPHS

- Encode data using bar lengths
  - Bar Graphs: Bars originate on y-axis
  - Column Graphs: Bars originate on the x-axis
- Provide quick visual comparisons of quantity
- A simple bar / column graph displays one trend or theme.
- A multiple bar / column graph displays two or more relationships simultaneously.
- The quantitative scale includes zero.

## Column graph



## Bar graph



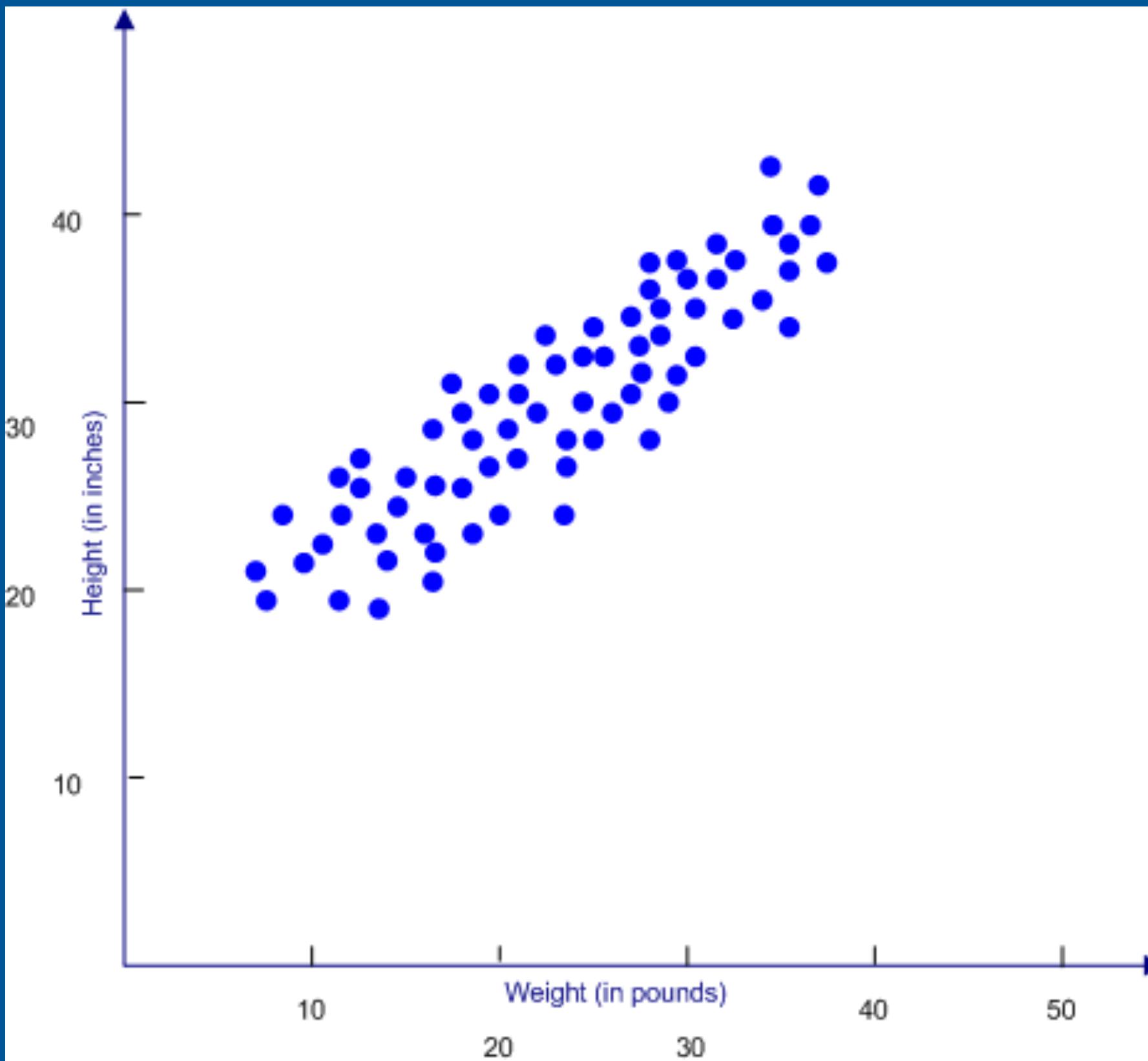
# SCATTER PLOTS AND LINE GRAPHS

Scatter plots and line graphs display two continuous variables using the Cartesian coordinate system.

- Independent variable: x-axis; Dependent variable: y-axis
- If more than one dependent variable is shown, the variables must be expressed in the same units or graphed in separate panels
- If graphed in the same panel, different data sets must be distinguished using labels, different line types, or color

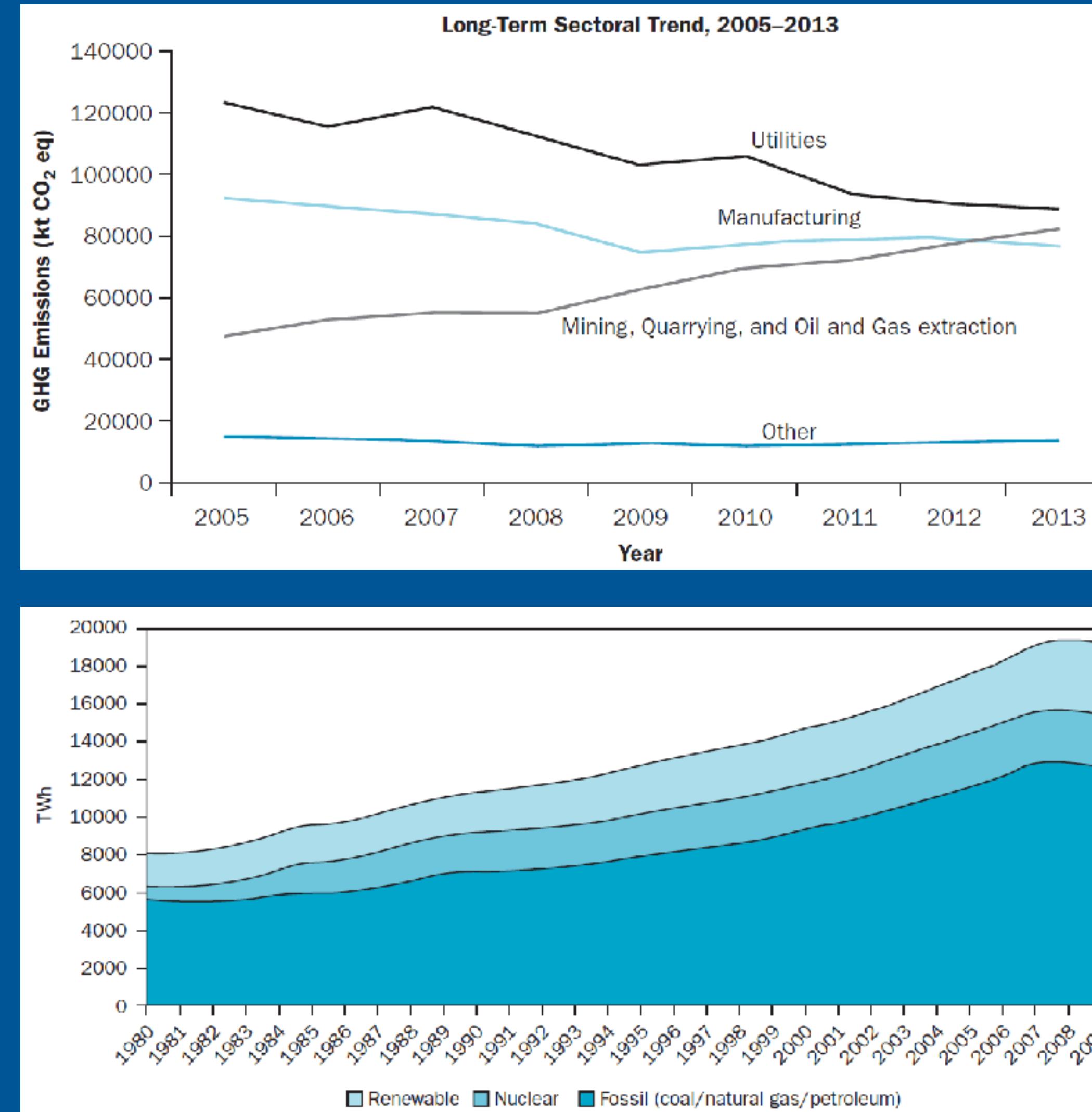
# SCATTER PLOTS

Display data with paired values, with an assumed dependent variable (y-axis) graphed as a function of the independent variable (x-axis).



# LINE GRAPHS

- Show trends over time
- Lines can be stacked to compare trends for multiple values
- Lines can be stacked cumulatively to show total value of several values over time.



# CHARTS

- Pie Charts
- Organization Charts
- Flow Charts
- Gantt Charts

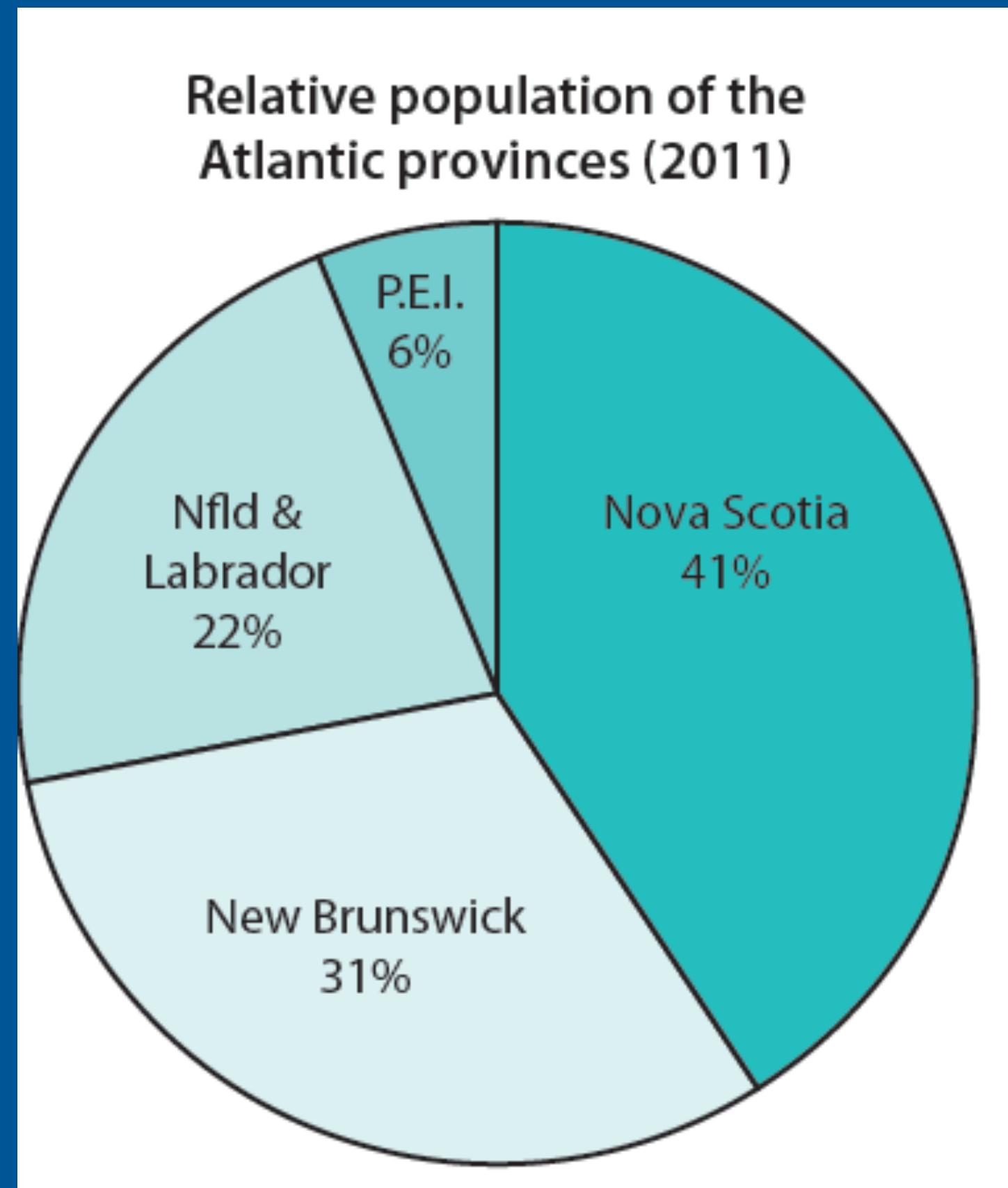


# PIE CHARTS

- Represent quantitative data in the angle and area of the sectors of a circle
- Suitable for comparing the quantities of one continuous variable, often as a percentage
  - Show proportions of a whole – must add up to 100%
- Limit the number of divisions (avoid clutter)
- Move clockwise from 12:00, from largest to smallest wedge

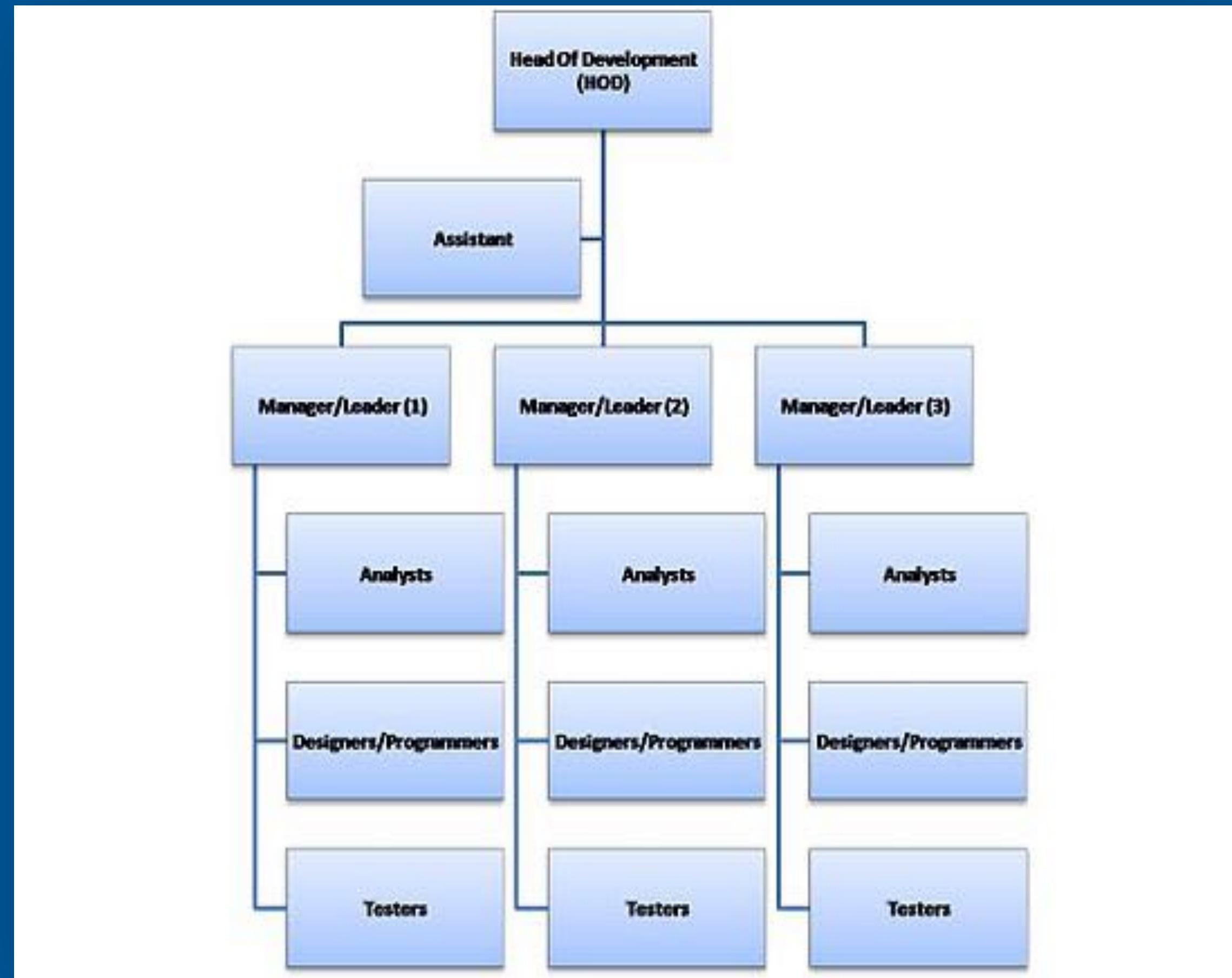
# EXAMPLE: PIE CHART

Represents quantitative data in the angle and area of the sectors of a circle.



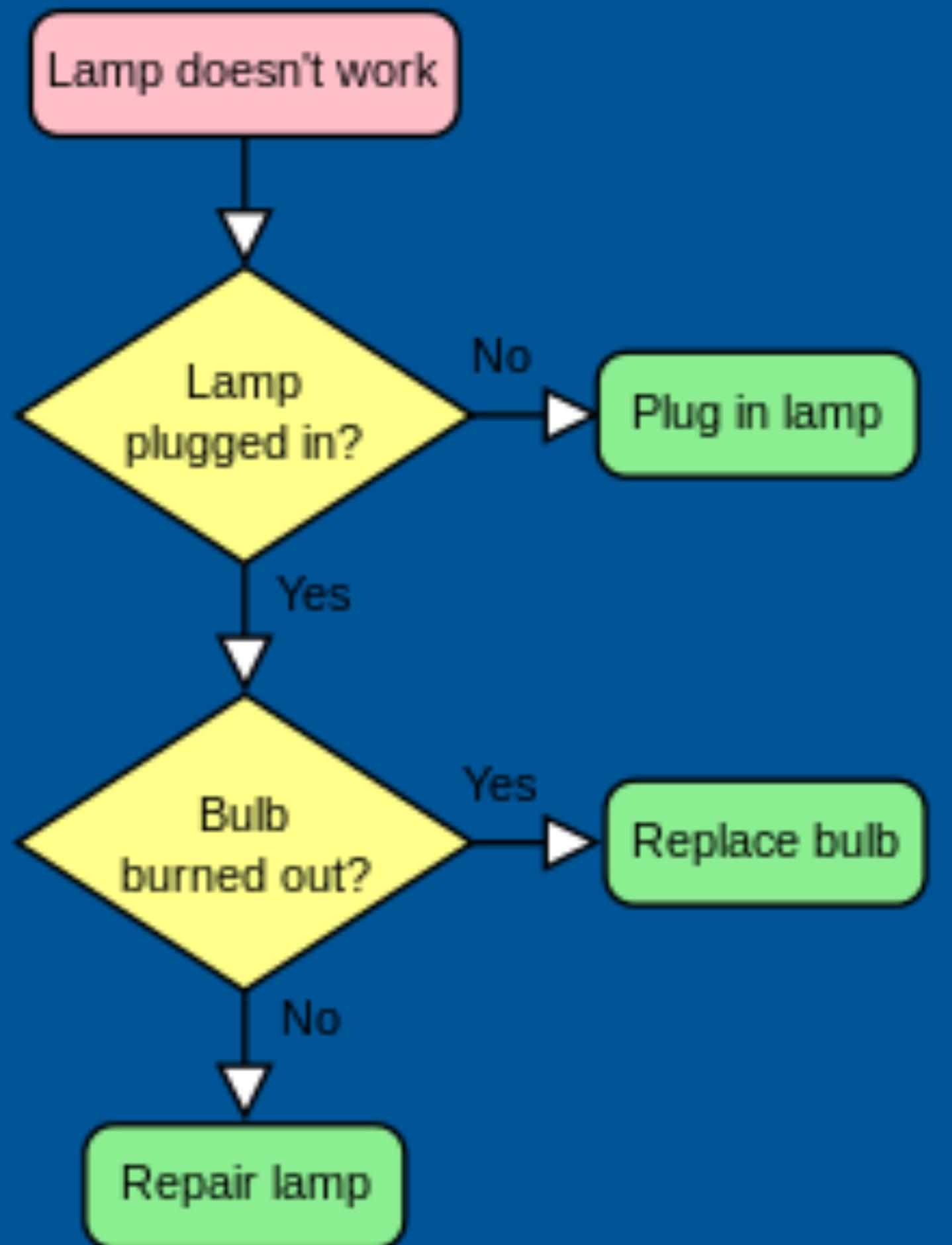
# ORGANIZATION CHARTS

- Show the hierarchy and relationships between different departments and other units in an organization.



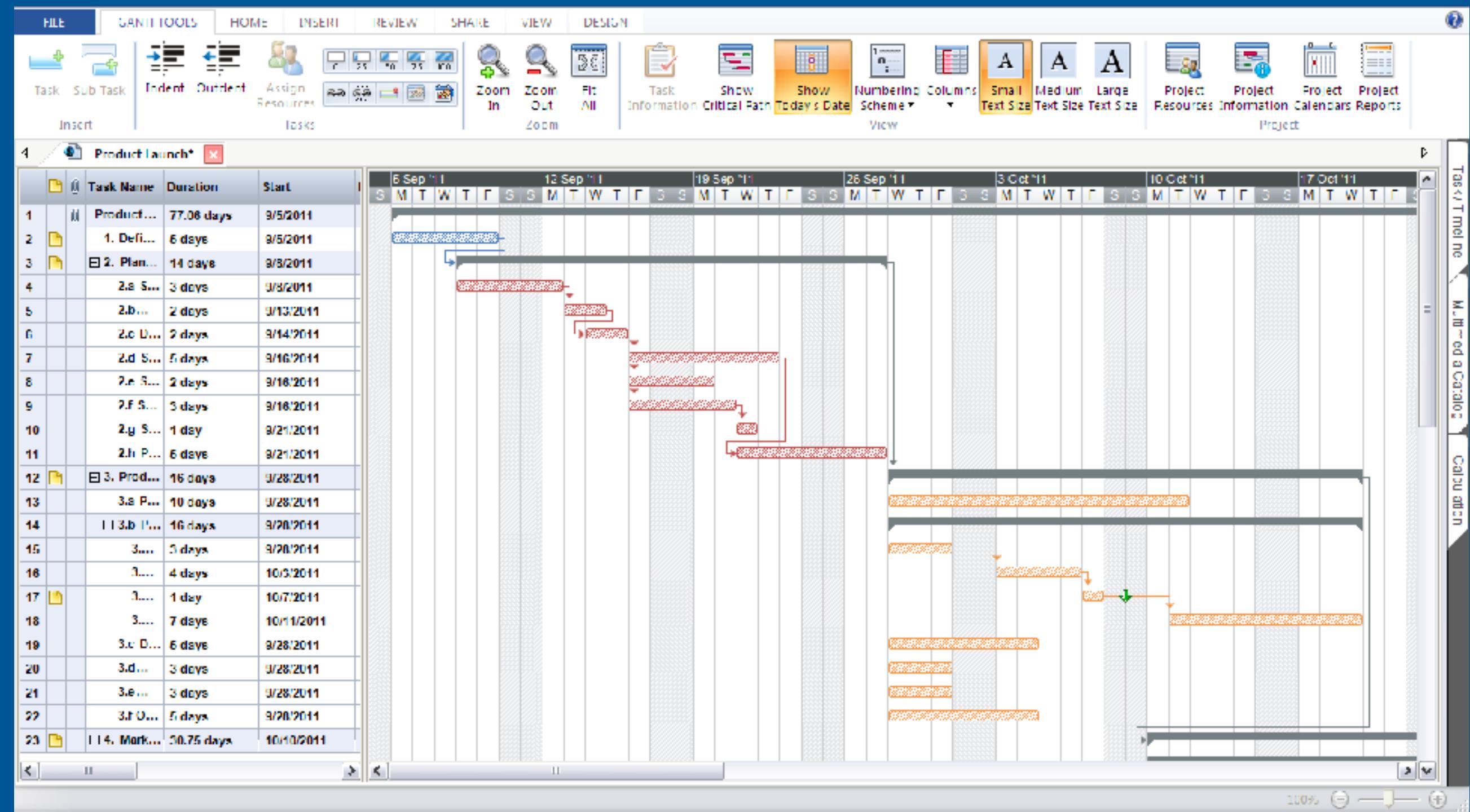
# FLOW CHARTS

- Use to trace the steps (or decisions) in a procedure or process



# GANTT CHARTS

Depict how the phases of a project interrelate



# GRAPHIC ILLUSTRATIONS



# GRAPHIC ILLUSTRATIONS

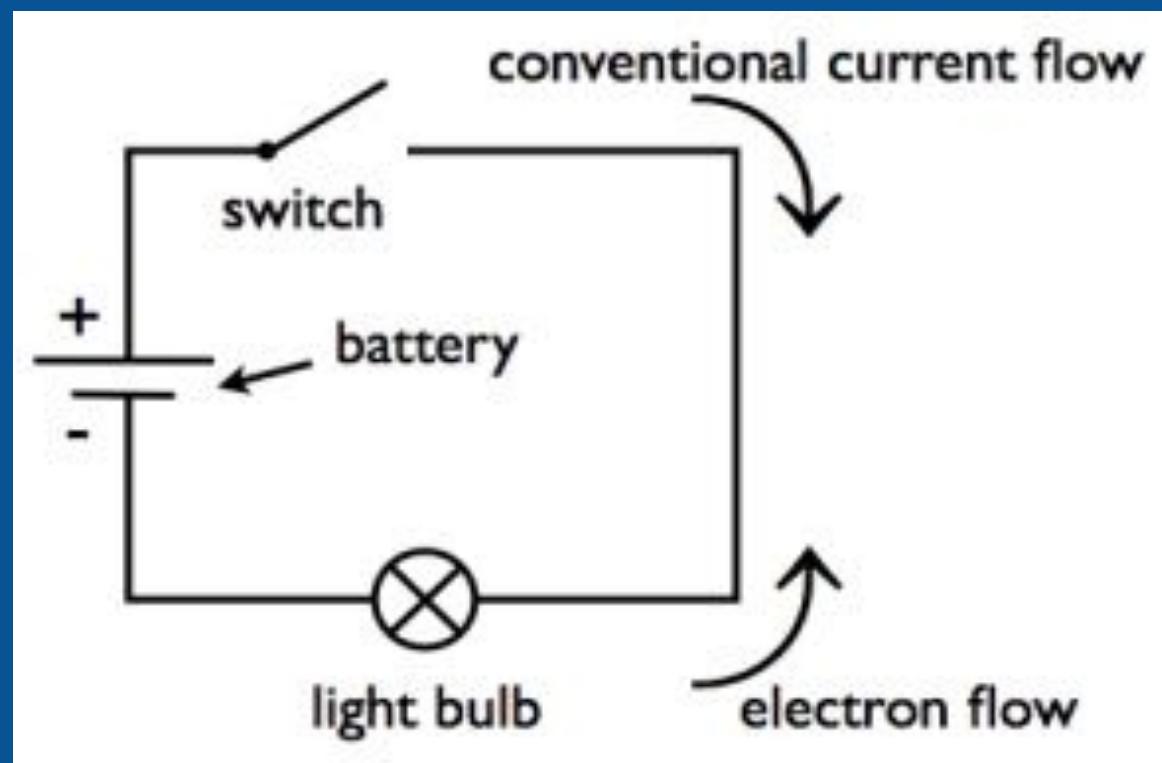
- Pictorial vs. Schematic Illustrations
- Line Drawings
- Detail Drawings
- Exploded View Drawings
- Section View Drawings

# PICTORIAL VS. SCHEMATIC



When would you use pictorial illustrations?

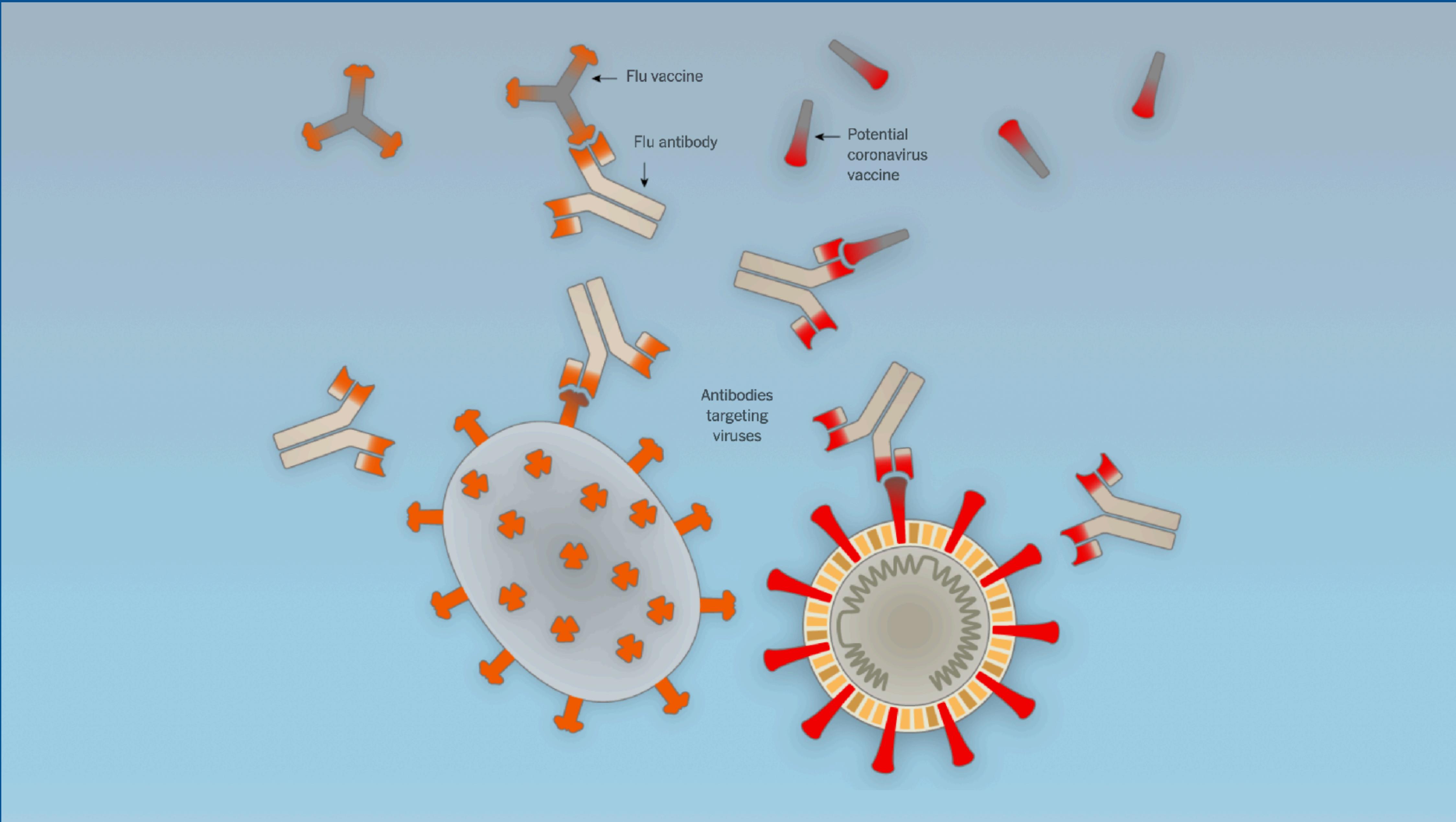
Pictorial images resemble objects without encoding



When would you use schematic illustrations?

Schematic images encode information without resemblance





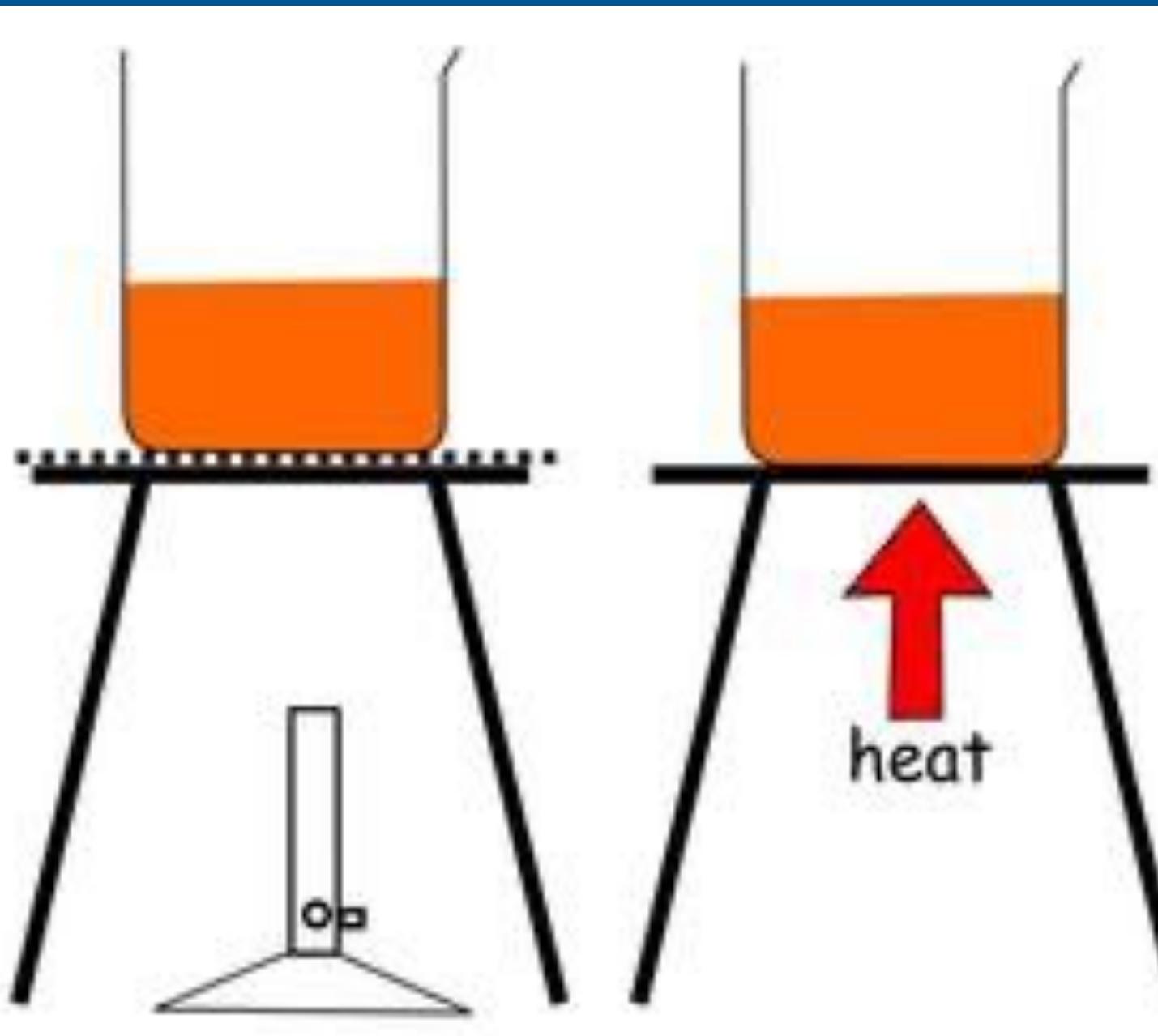
# LINE DRAWINGS

- Present a simplified visual abstraction of a physical system
- Allow us to remove irrelevant, confusing, or distracting elements of the system, drawing the audience's attention to the exact features, properties, locations, and relationships that we want to emphasize

# PHOTOGRAPH VS. LINE DRAWING



photo of a setup for  
a heating experiment



2D diagram of  
the same setup

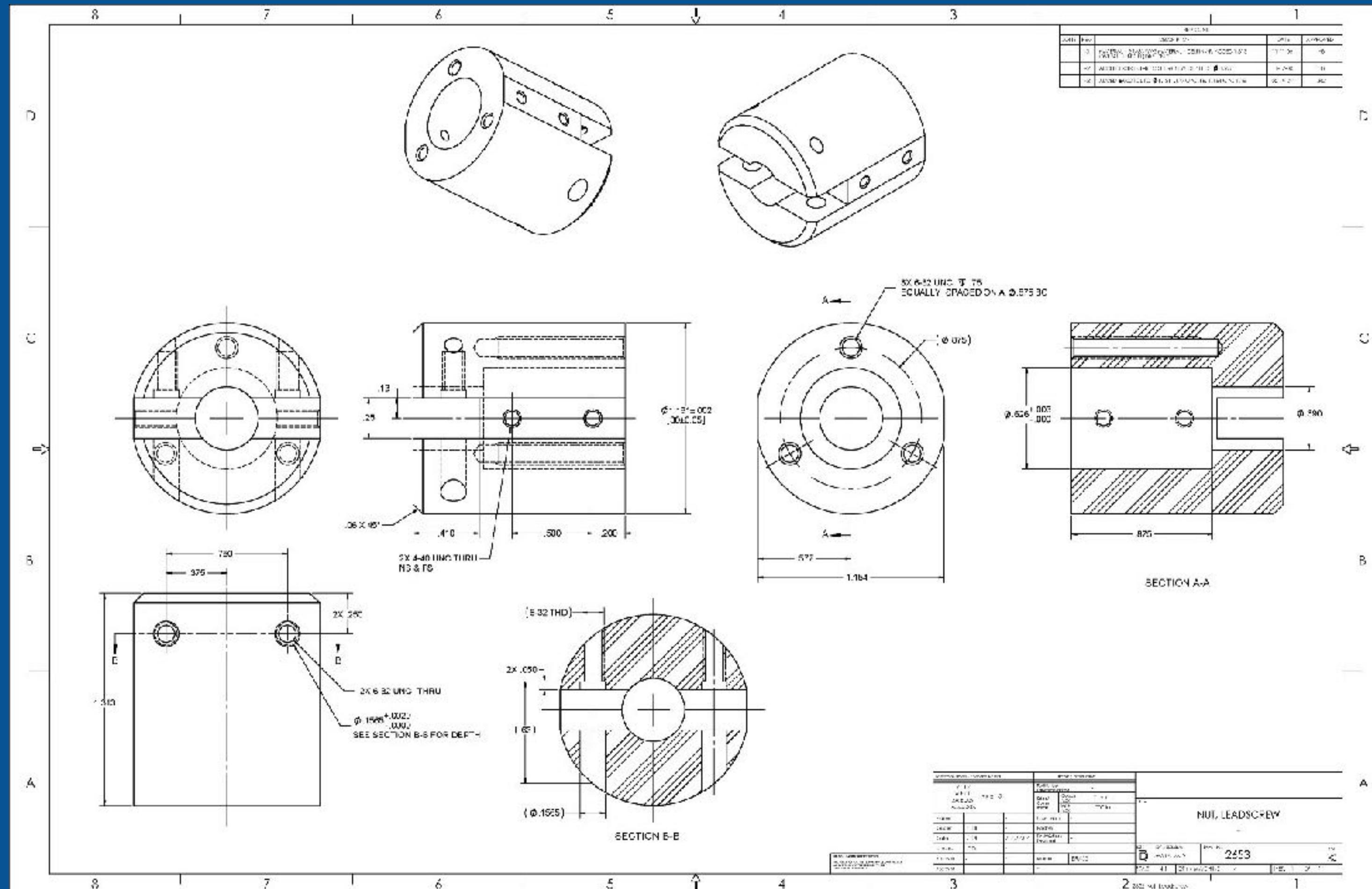
simplified  
2D version



# DETAIL DRAWINGS

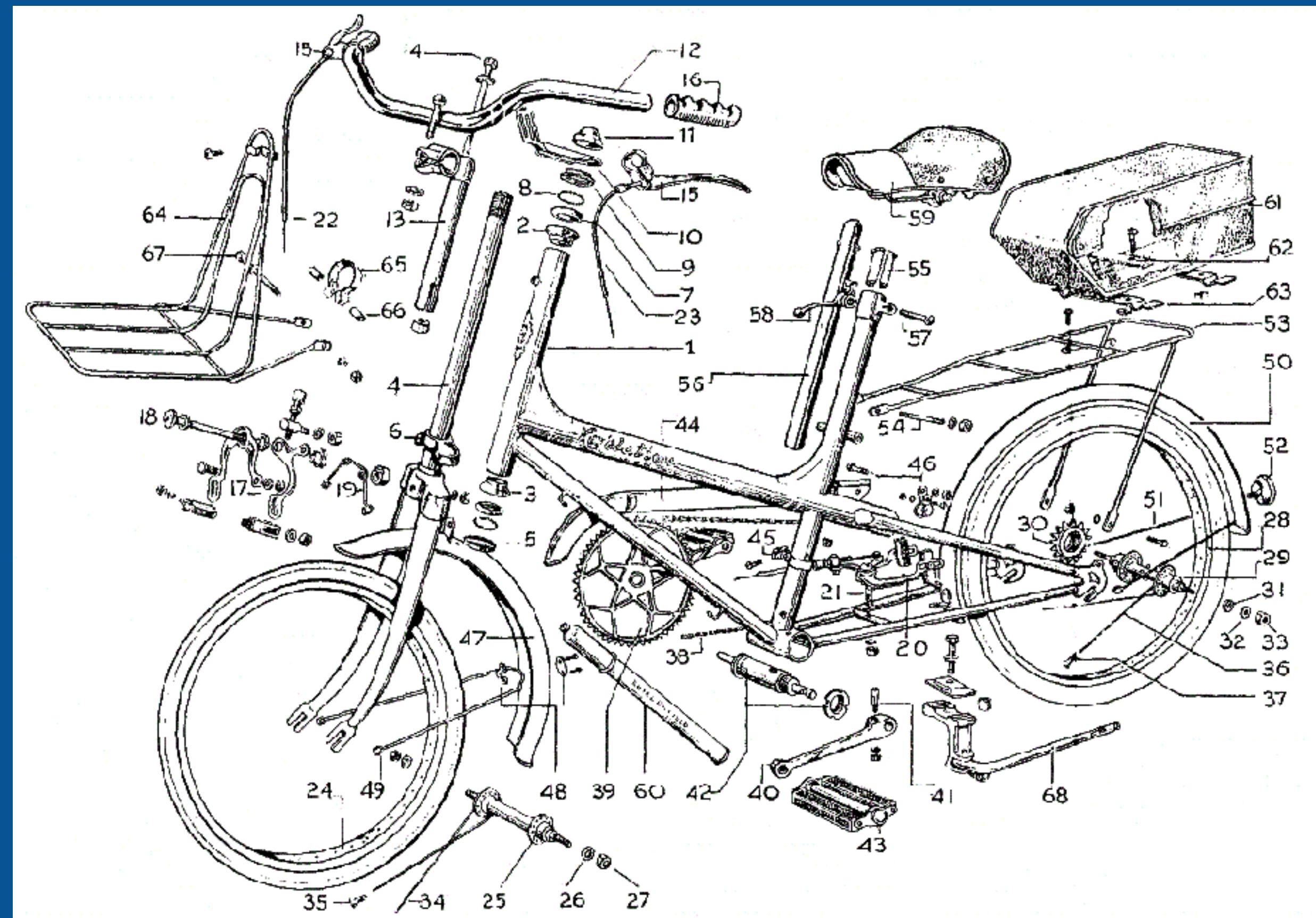
- Document the design process, the manufacturing requirements, and the specifications to be examined during the inspection of a part or assembly
- Focus on specifications rather than on appearance
- Dimensions are included to communicate the size and location of every feature of the object or assembly
- Additional information like manufacturing notes, inspection tolerances, and vendor information may be included

# EXAMPLE: DETAIL DRAWING

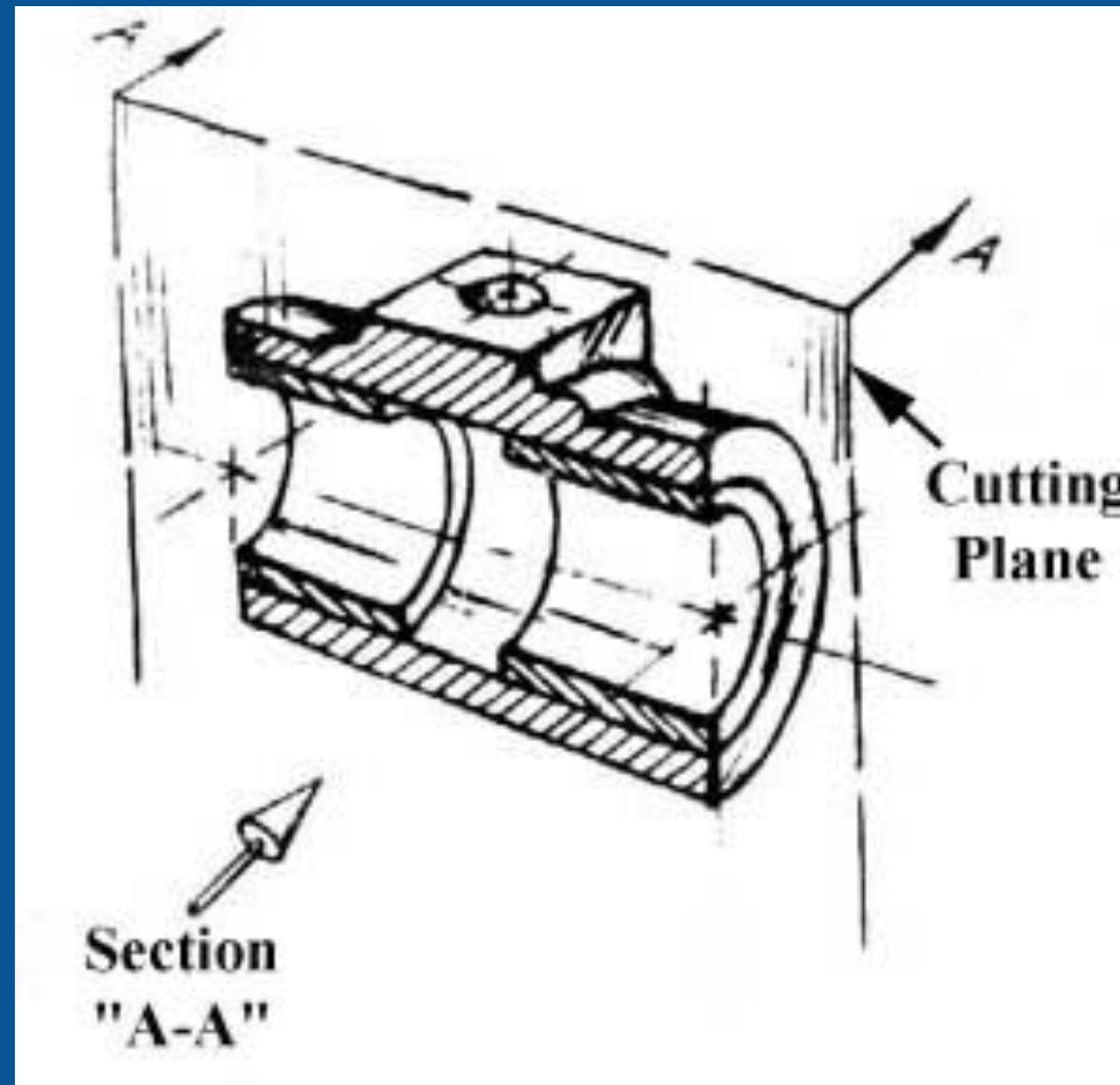
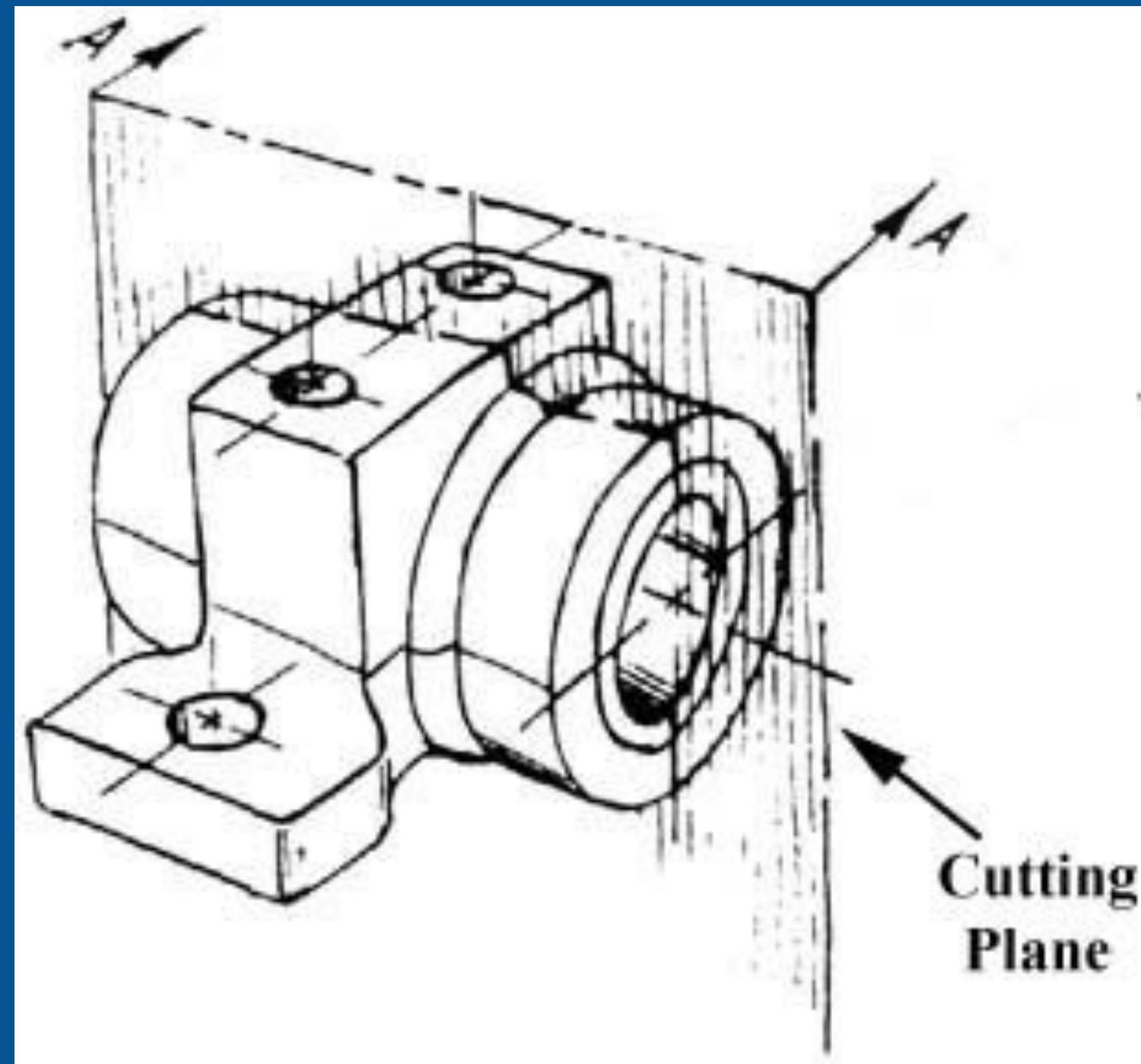


# EXPLODED VIEW DRAWINGS

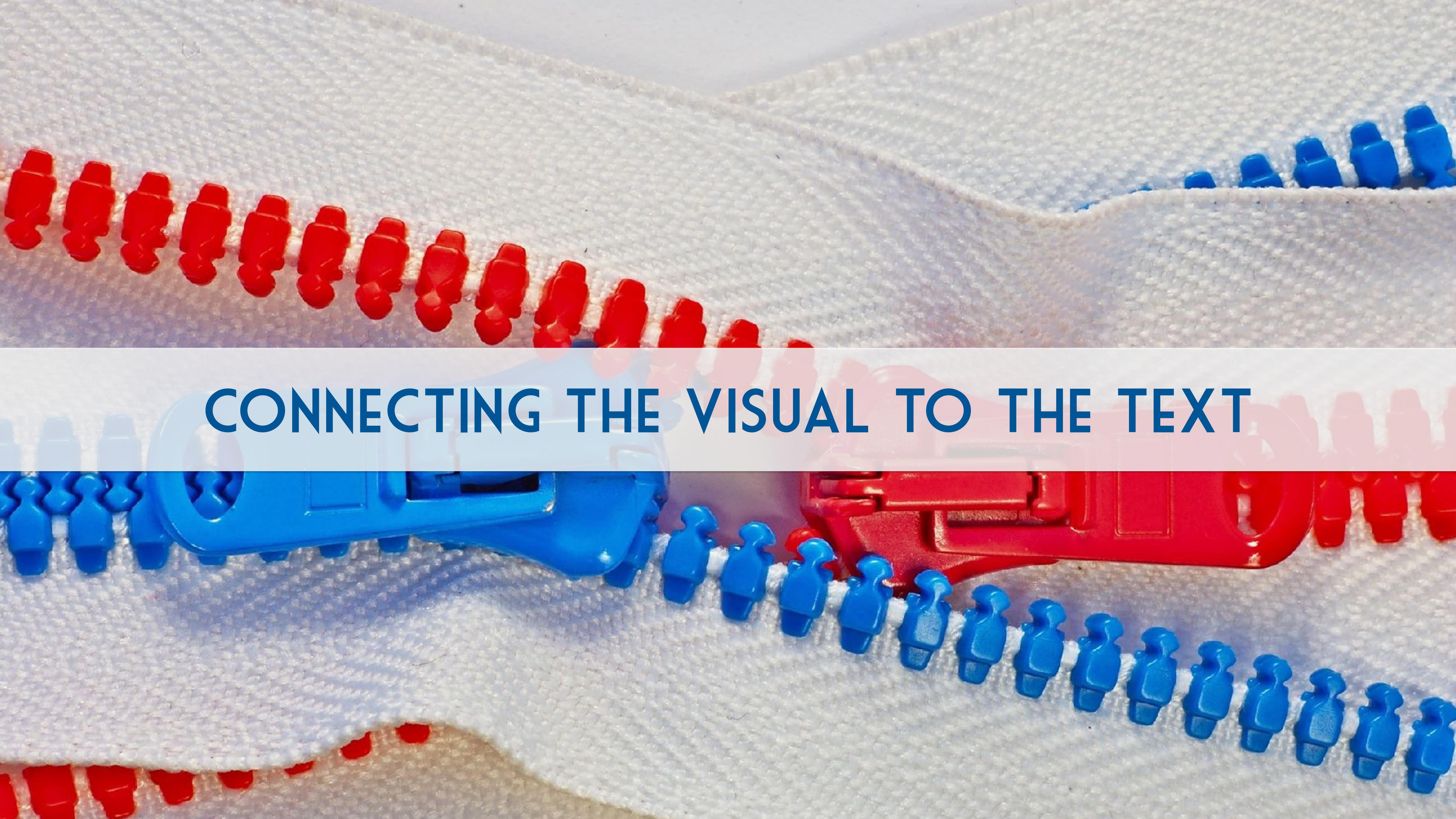
Show the component parts of an assembly separated in space but in relative position to one another, such that the assembly order is obvious



# SECTION VIEW DRAWINGS



Show interior features of a part or assembly when a user cannot see the relevant details as the object is ordinarily perceived.

A close-up photograph of a zipper running horizontally across the frame. The zipper has two rows of teeth: one row is red and the other is blue. The slider is a translucent light blue color. The background is a plain, light-colored surface.

**CONNECTING THE VISUAL TO THE TEXT**

# INCLUDE CAPTIONS AND LABELS

- Orient a viewer to the visual
- Focus the viewer's attention onto what's important about the visual
- Tables have titles; figures have captions. Figures are a number set, and tables are a separate number set

# REFER TO ALL VISUALS IN THE PRECEDING BODY TEXT

- See Figure 1; Refer to Table II
- Figure 3 illustrates / shows / compares ...
- As Figure 4 indicates, ...
- Use a distinguishing feature, like italics (*Figure 5*)
- Further detail about X can be found in Table 6

**Examples:**

As Figure 8 indicates, the modulus of the transverse direction was always equal to or greater than the modulus of the machine direction.

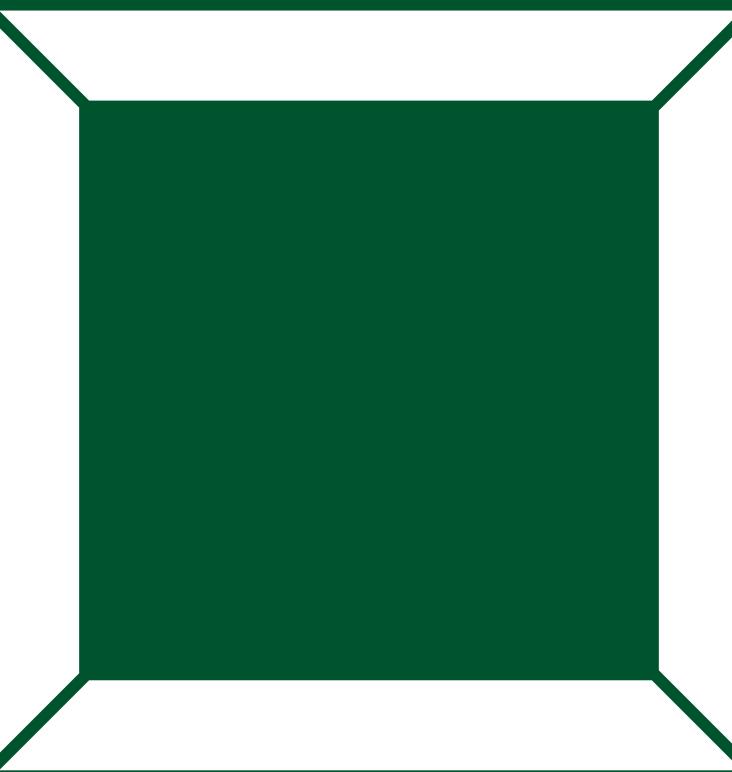
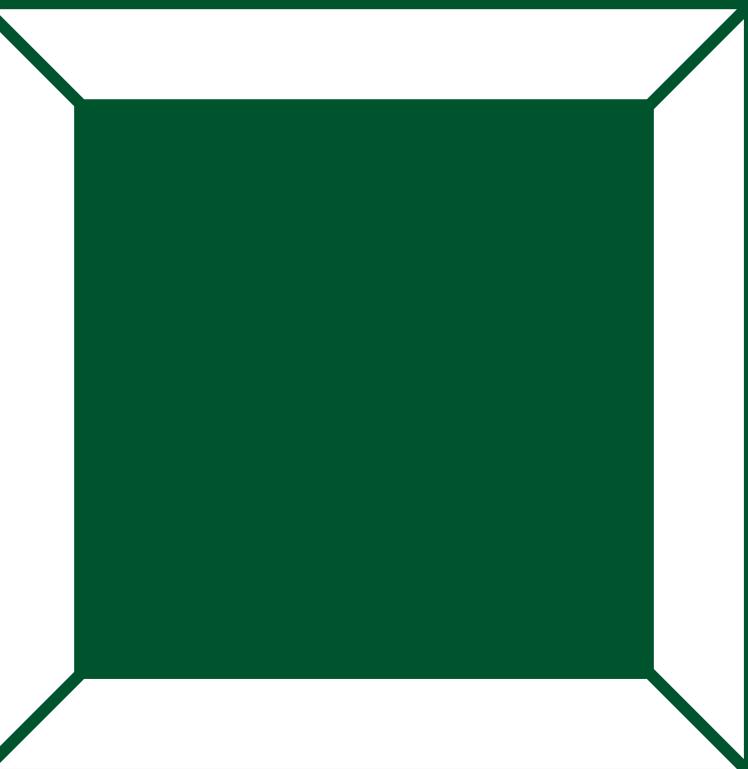


Figure 5 compares two magnetization curves for hard and soft magnetic materials.



# THINK ABOUT WHERE TO PLACE VISUALS

Locate a visual close to where it is referenced in the text:

- Same page as text reference
- Page opposite text reference
- Page following first text reference
- Attachments or appendices

# POSITION VISUALS VERTICALLY, WHEN POSSIBLE

- Readers prefer visuals that they can view without turning the document sideways
- If the visual does not fit vertically:
  - Use a foldout
  - Place the graphic horizontally  
(in this case, the top of the visual should be in the left margin)

# MAKE SURE FIGURES AND TABLES ARE LEGIBLE

Time #1-#4 information

Standard values for:  
Picking, Walking, Tuggers & Ride Alongs

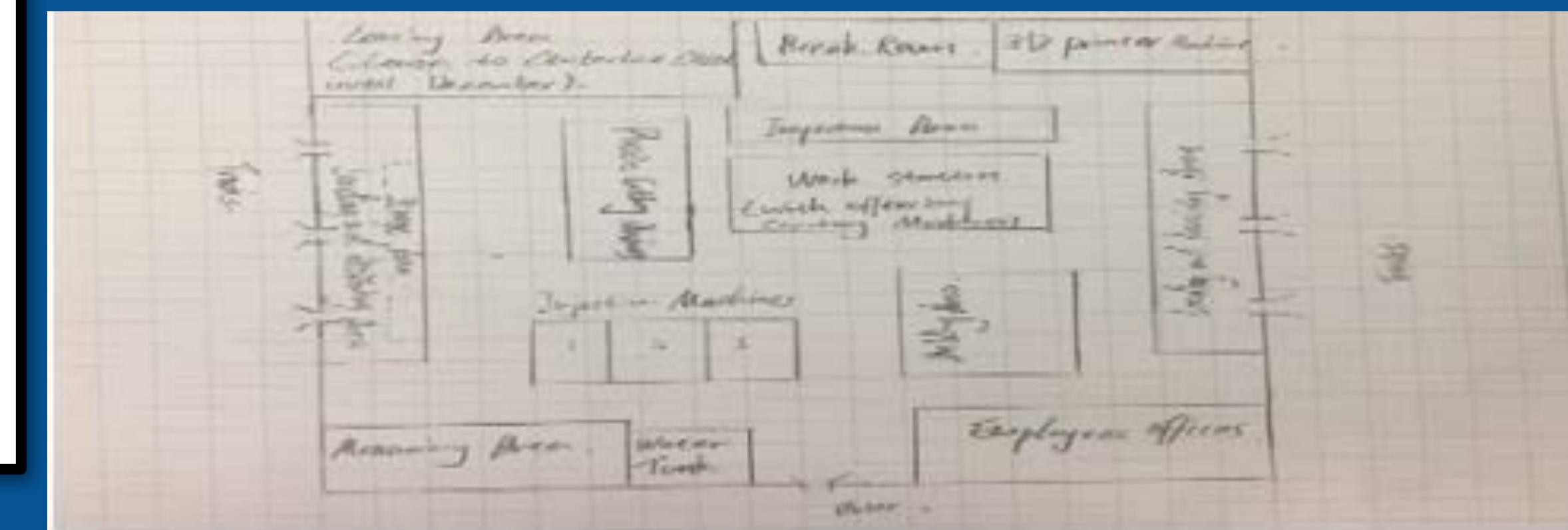
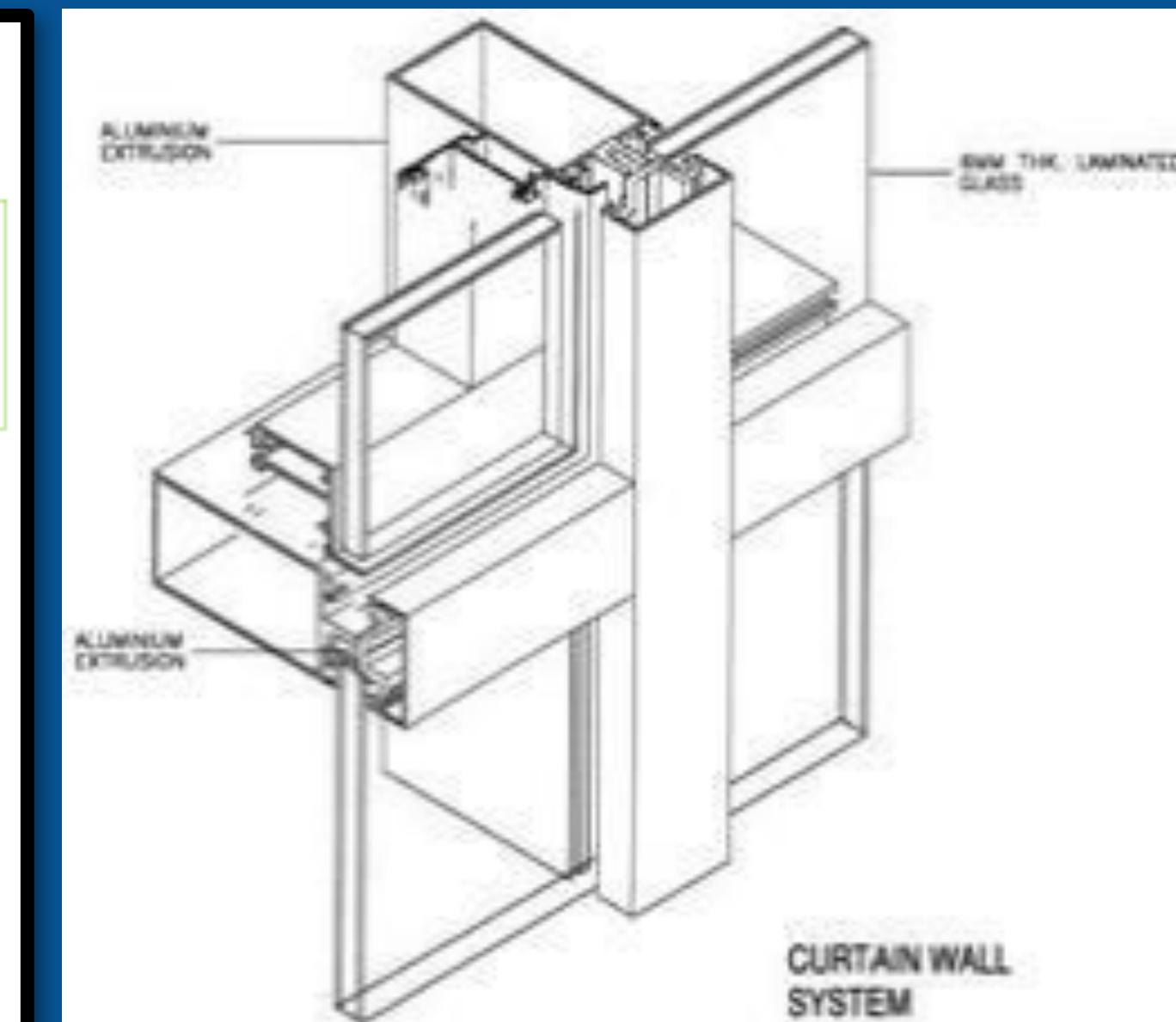
No.	Type	Element	Score	Time	Pounded	Element Time	Running Time
1	Miscellaneous	Initial Setup		0.0	0.0	0.0000	0.0000
2	Travel	Travel to warehouse #1 & C11	11	2.2	2.2	0.0000	0.0100
3	Walking	Tugger and 1 or part deliveries back up	65	0.2	0.2	0.0000	0.0100
4	Travel	Travel time while picking in warehouse	130	3.0	3.0	0.0000	0.0140
5	Travel	Tugger and 1 or part deliveries back up	180	3.6	3.6	0.0000	0.0148
6	Travel	Travel to HLD	20	0.4	0.4	0.0000	0.0040
7	Travel	Travel time while picking molding	40	0.8	0.8	0.0000	0.0040
8	Walking	CART setup	0	0	0	0.0000	0.0000
9	Travel	Travel to warehouse #2	17	3.4	3.4	0.0000	0.0140
10	Travel	Picker walking picking HLD components	140	2.8	2.8	0.0000	0.0140
11	Travel	Picker in ACD	125	2.5	2.5	0.0000	0.0140
12	Travel	Travel to C18, C20	140	2.8	2.8	0.0000	0.0140
13	Travel	Travel to P24, P25, P27	80	1.6	1.6	0.0000	0.0080
14	Travel	Picker walking picking	20	0.4	0.4	0.0000	0.0040
15	Travel	Travel to Shop, cutting	20	0.4	0.4	0.0000	0.0040
16	Travel	Travel to Shop, cutting 2nd Location	40	0.8	0.8	0.0000	0.0080
17	Travel	Travel to Warehouse, empty supplier rolls	100	21.6	21.6	0.0000	0.2160
18	Walking	Tugger and 1 or part deliveries back up	0	0	0	0.0000	0.0000
19	Miscellaneous	Move product to process pick time	270	2.70	2.70	0.0000	0.0270
20	Travel	Travel while dropping off supplier rolls	40	13.6	13.6	0.0010	0.0136
21	Walking	Travel of schedule	65	0.65	0.65	0.0000	0.0065
22	Miscellaneous	Scanning values entered, order from, order to, score	32.00	13.00	13.00	0.0000	0.1300

Time study performed on: Nov. 2/11  
Time study performed by: Jon T

Data from individual cells is pulled to each line item.  
→ Avg. time column from the summary page uses data from this column.

Travel time → is measured in ft multiplied by the standard time.  
Only Travel time is calculated in the above chart.

Each time section has its own avg values that are pulled to the summary sheets. Any changes done in these sheets will automatically update the summary sheet.



# CITE AND REFERENCE VISUALS

## Need to be cited and referenced:

- Visuals taken directly from a source (treat these like direct quotations)
- Visuals that have been created using someone else's data (treat these like a paraphrase)
- Visuals that have been adapted or changed (treat these like a paraphrase)

## Do not need to be cited and referenced:

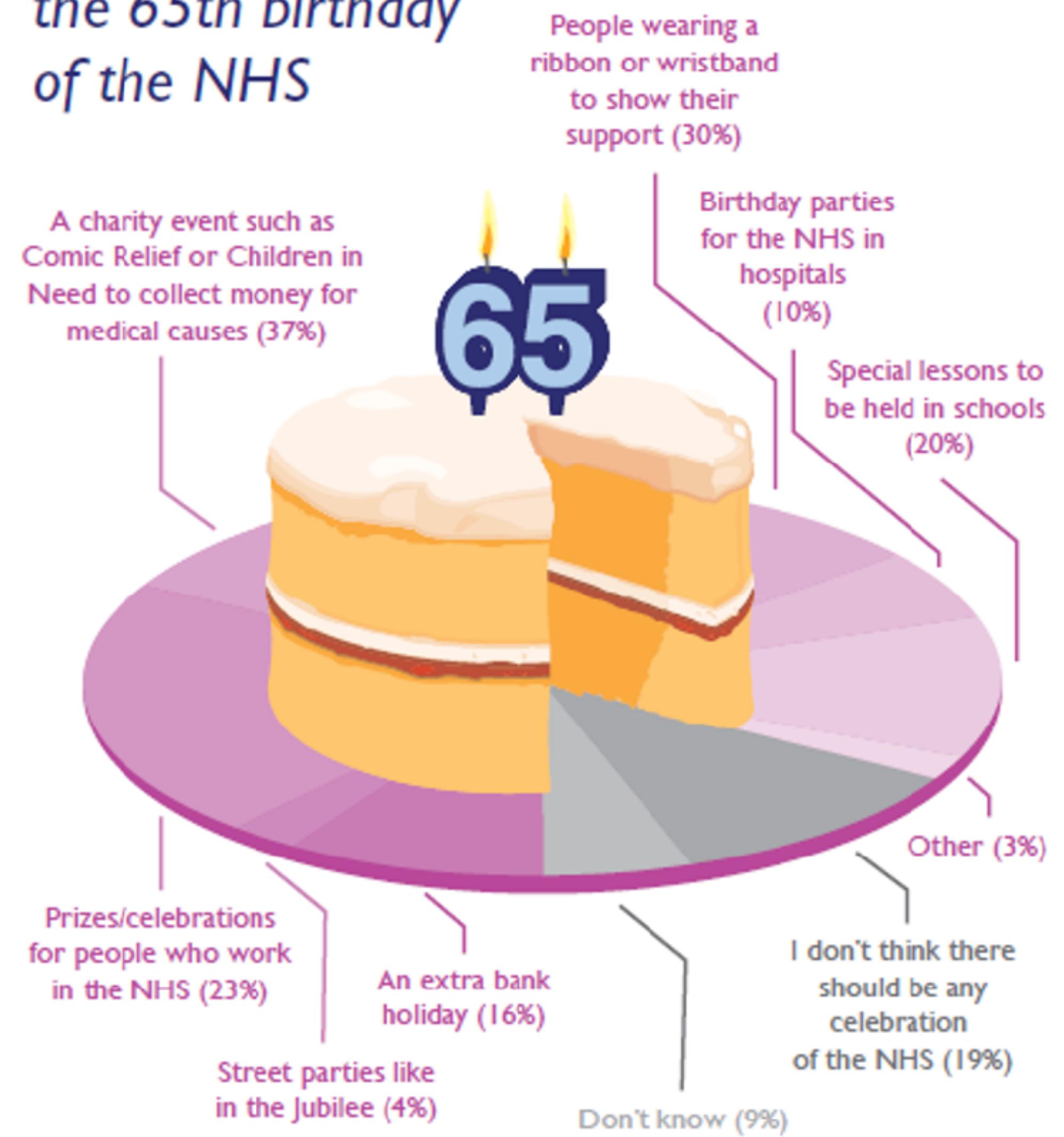
- Visuals created entirely by you with data created entirely by you

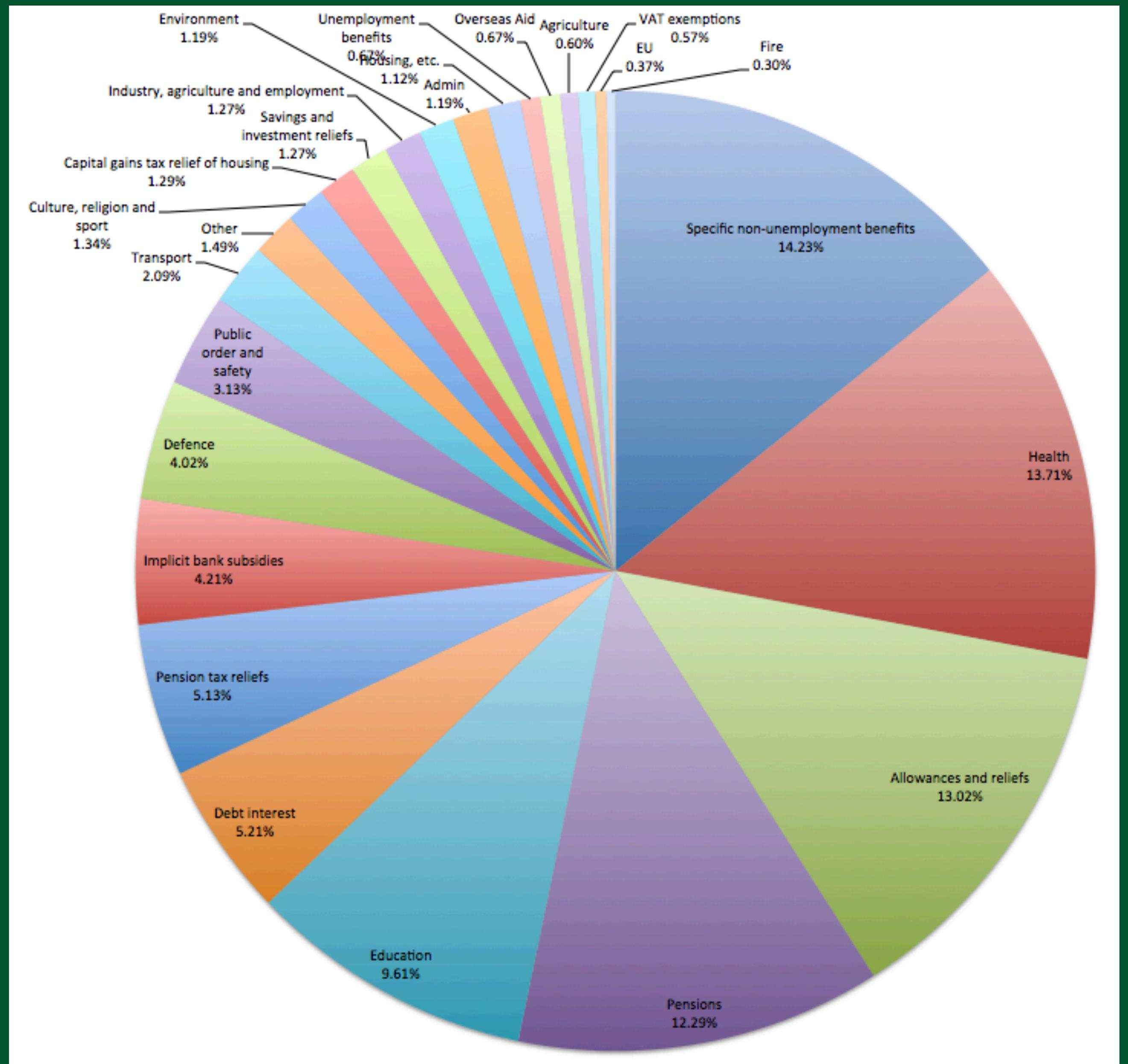
# AVOID CLUTTER

- Readers go to visuals for relief from, or reinforcement of, the text
- Keep it simple
- Omit information that is not relevant
- Use enough white space that the readers' eyes are drawn to the visual

**Examples:**

## *How would you like to celebrate the 65th birthday of the NHS*







# GRAPHICAL MISREPRESENTATION

# GRAPHICAL MISREPRESENTATION

- Graphs visually display complex relationships
- Information can be seen at a glance
- Details may be overlooked

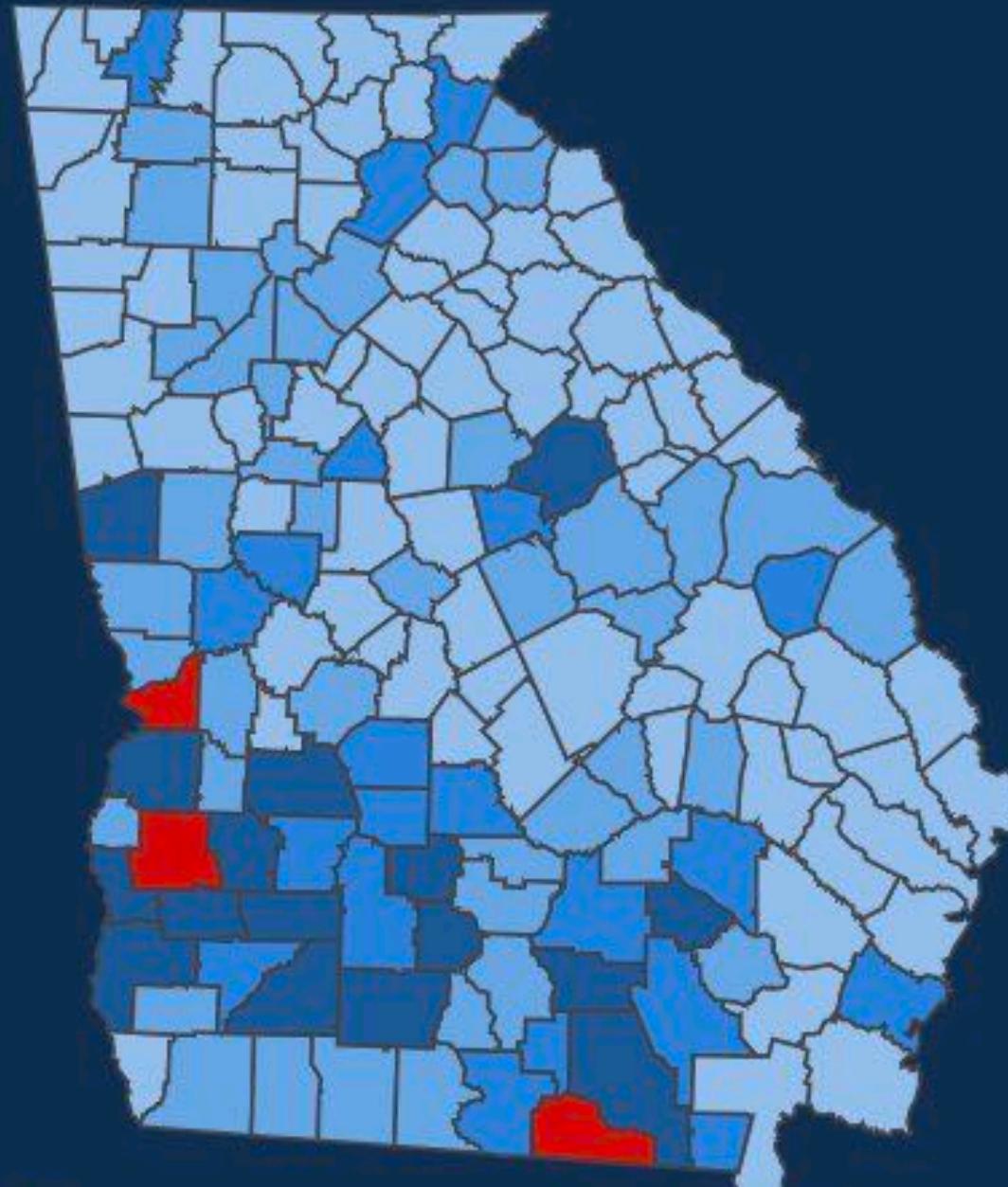


**Andisheh Nouraei**  
@andishehnouraei



In just 15 days the total number of **#COVID19** cases in Georgia is up 49%, but you wouldn't know it from looking at the state's data visualization map of cases. The first map is July 2. The second is today. Do you see a 50% case increase? Can you spot how they're hiding it? 1/

## Cases per 100K▼

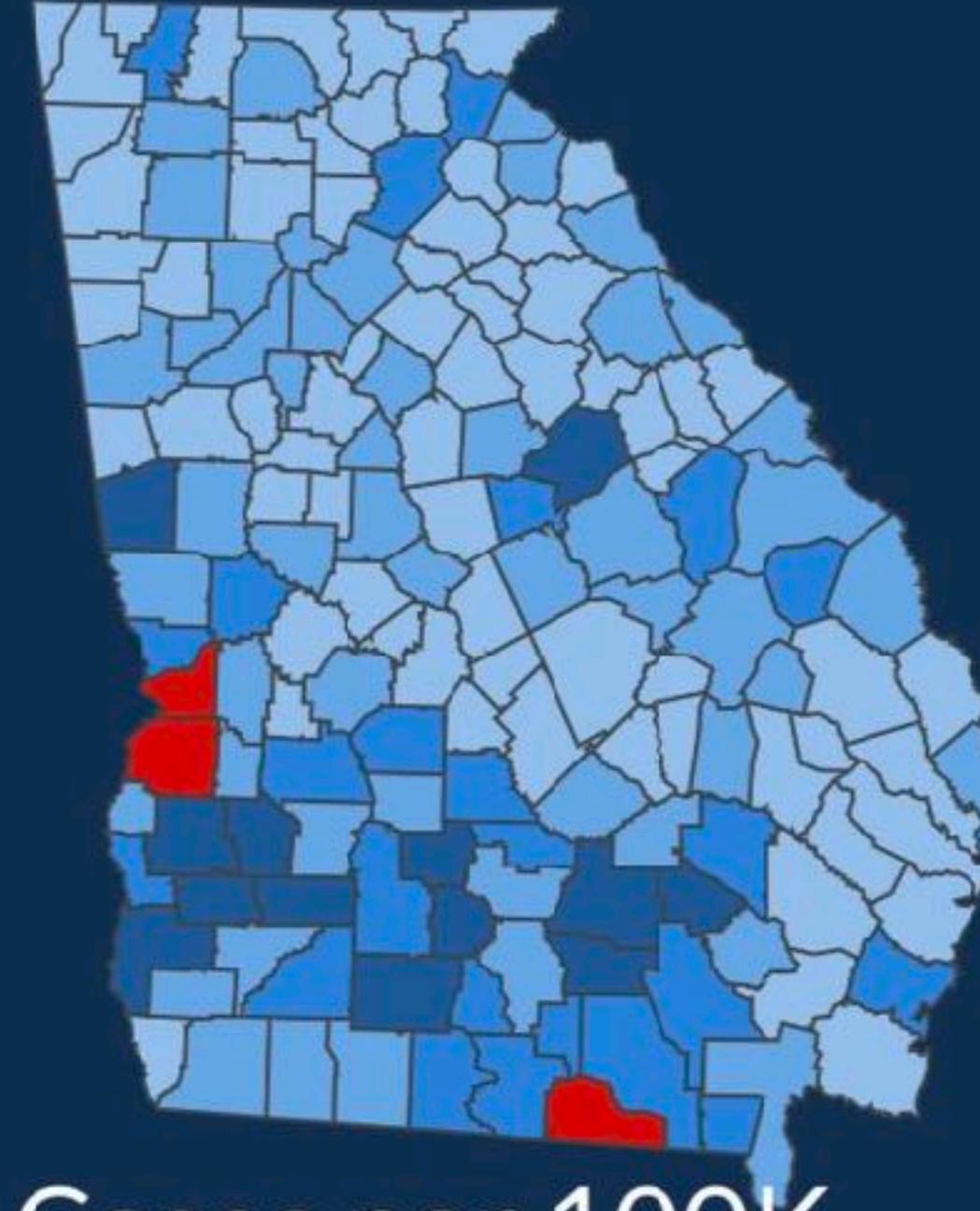


Cases per 100K

- None
- 1,071 - 1,622
- 1 - 620
- 621 - 1,070

- 1,071 - 1,622
- 1,623 - 2,960
- 2,961 - 4,661

## Cases per 100K▼



Cases per 100K

- None
- 1,556 - 2,336
- 1 - 949
- 950 - 1,555

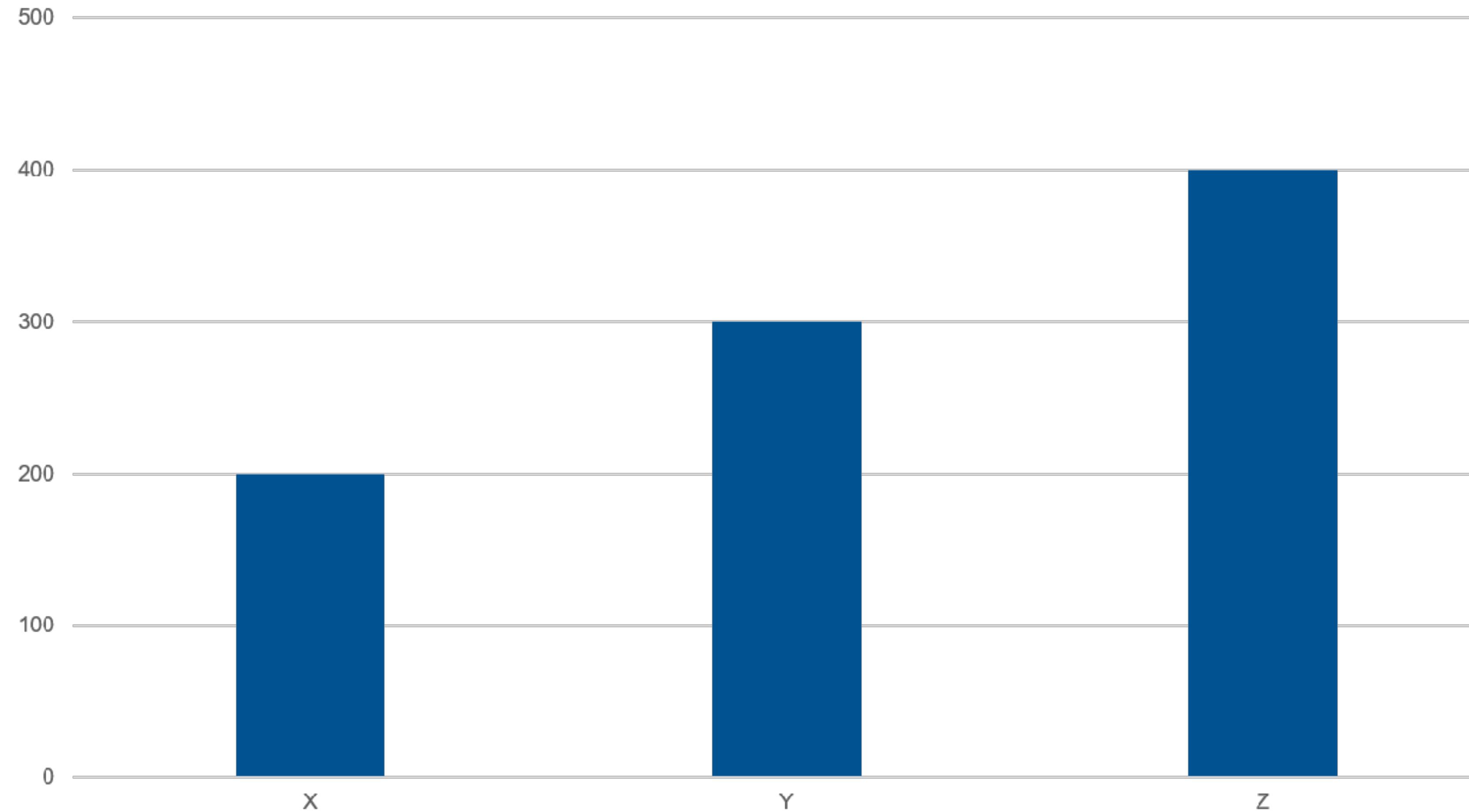
- 2,337 - 3,768
- 3,769 - 5,165

## **Example bar graphs:**

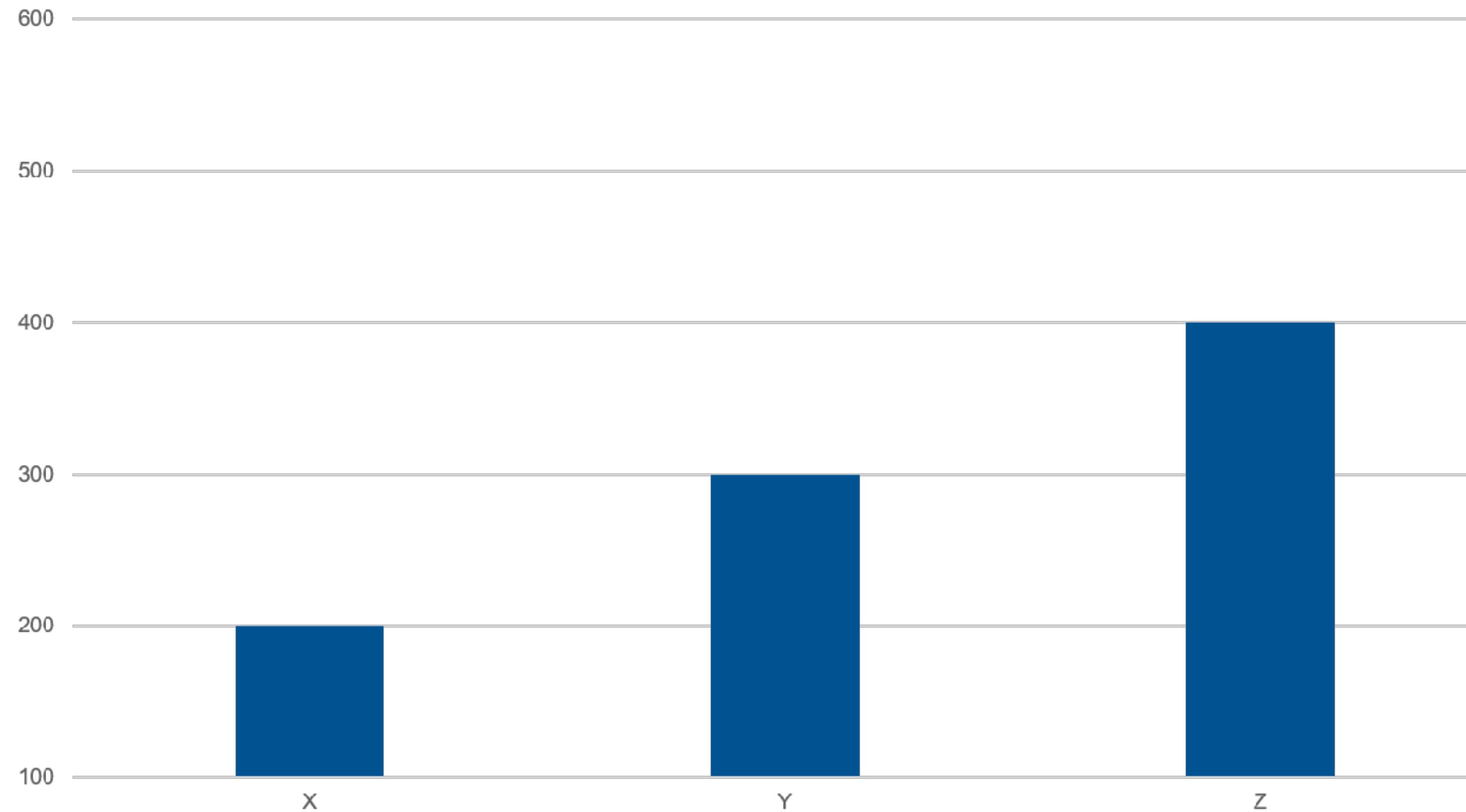




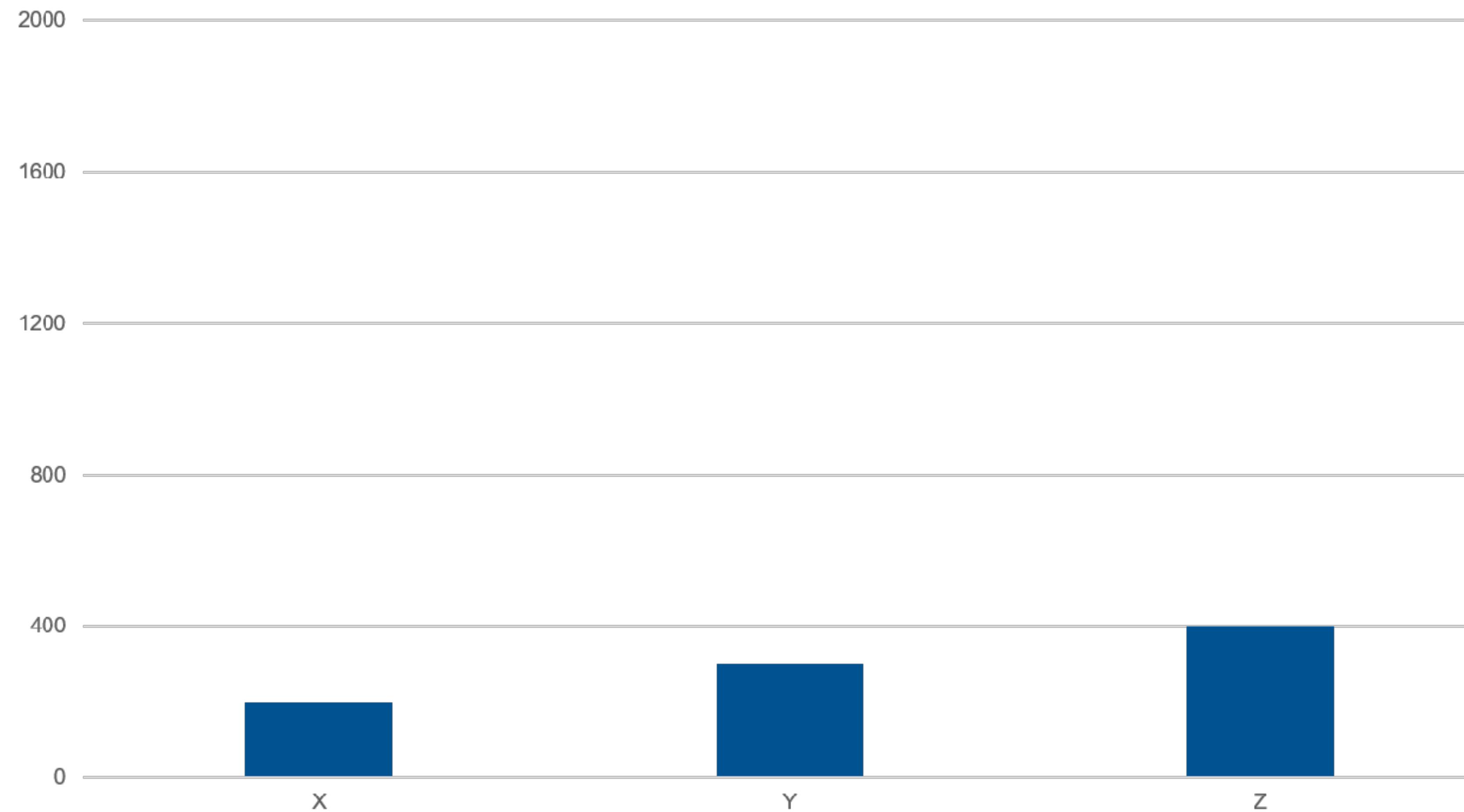
# Accurate

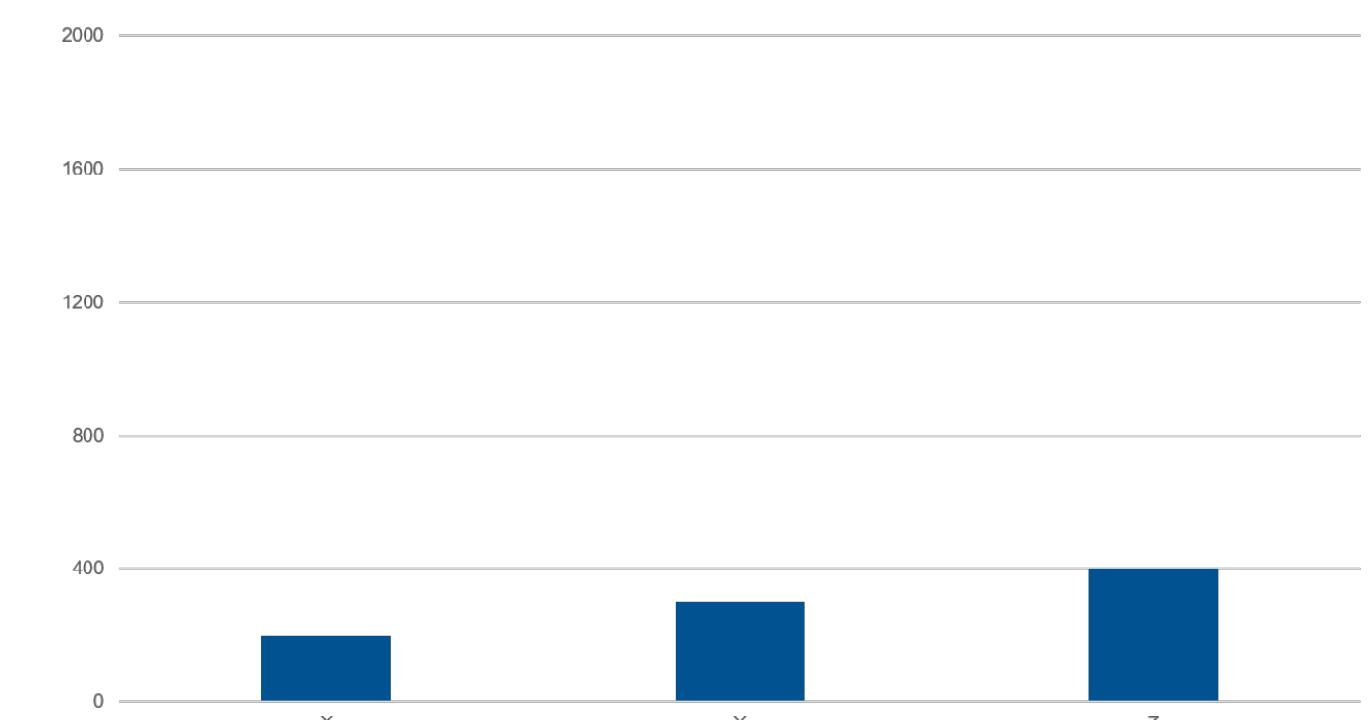
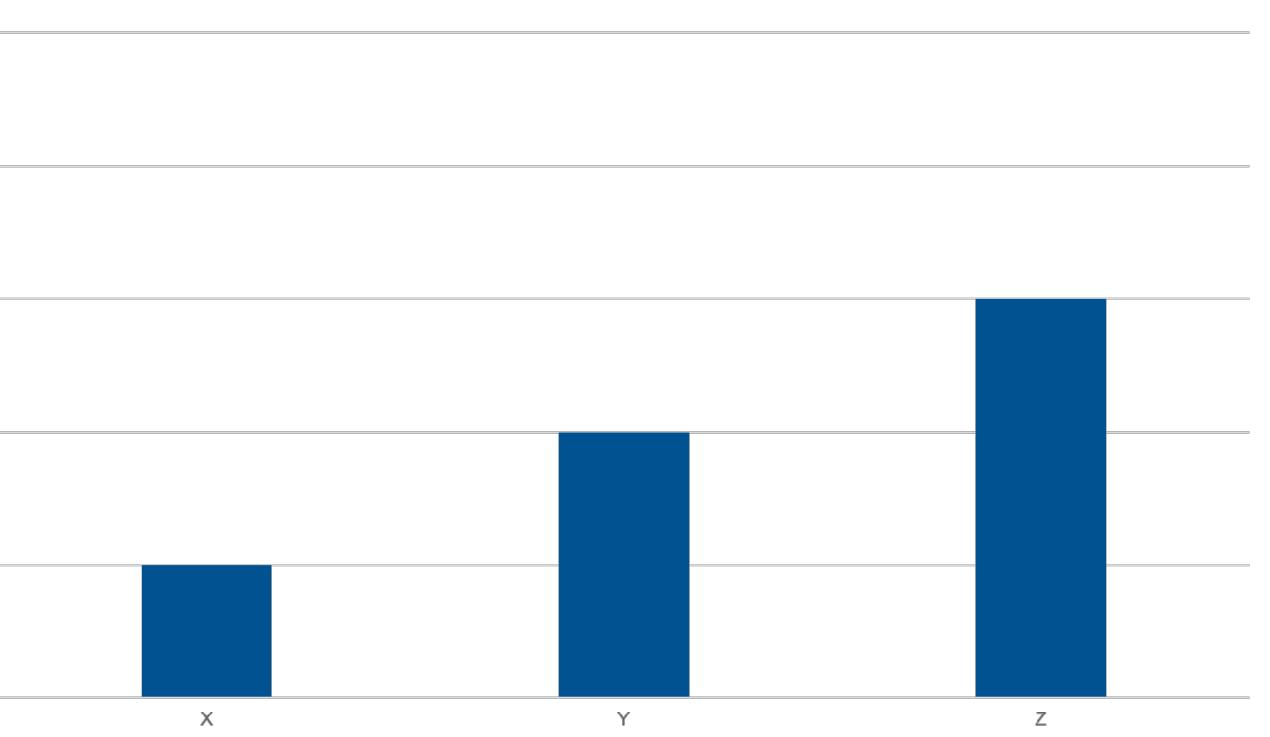
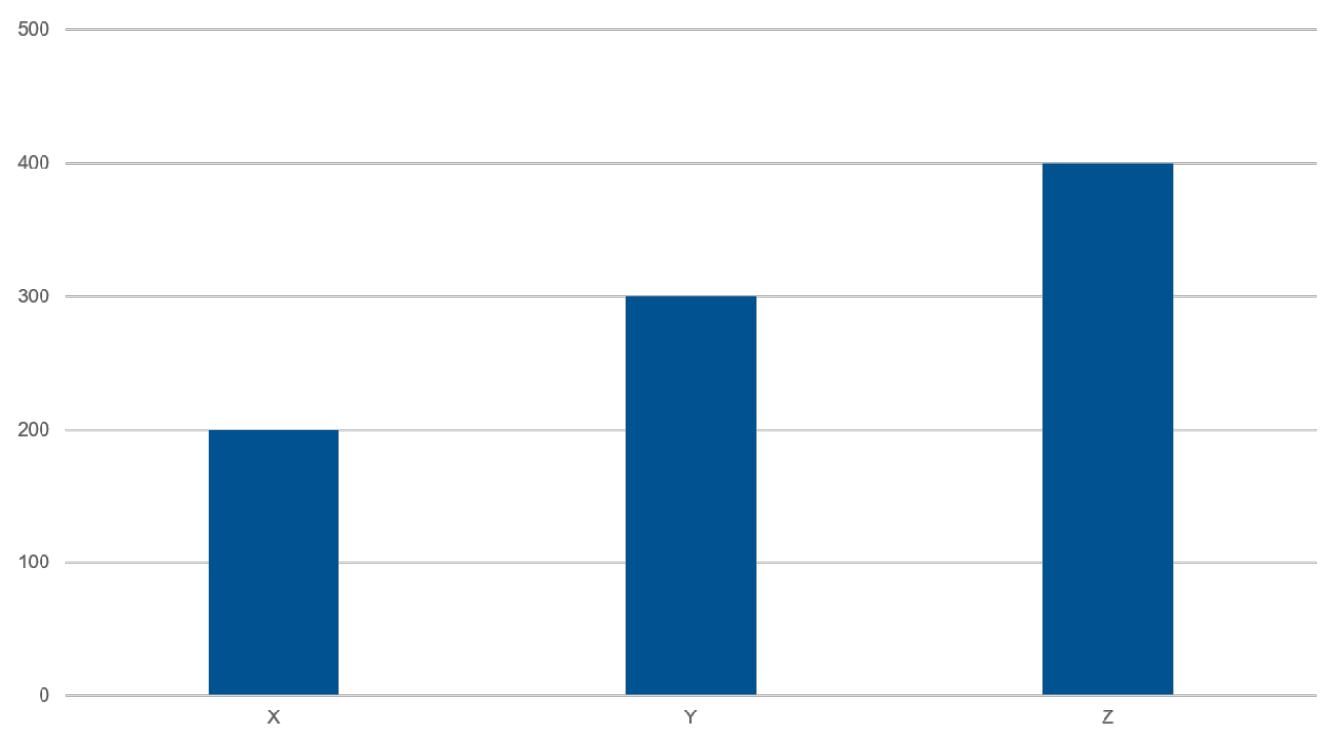


# Overstated



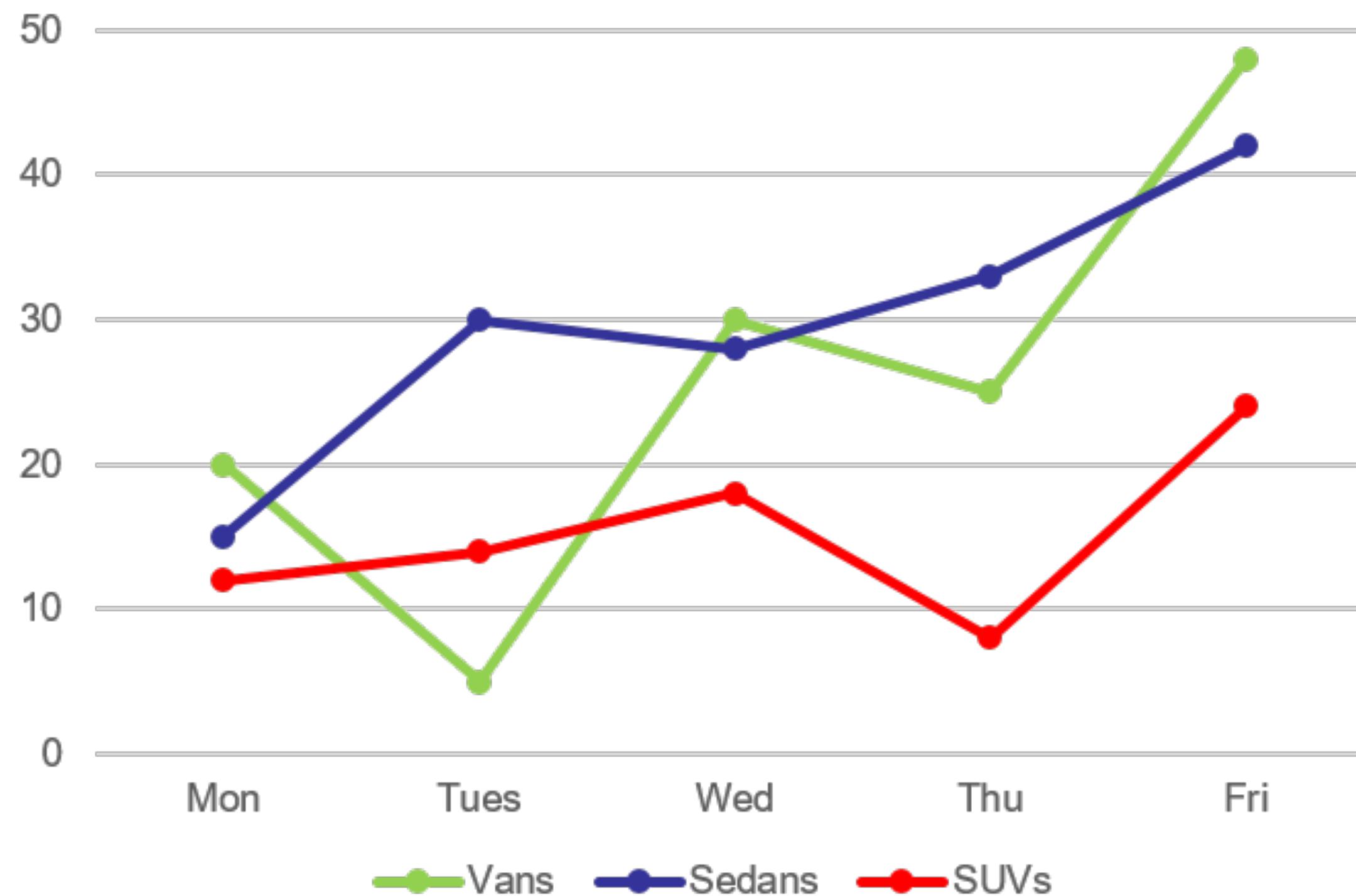
# Understated





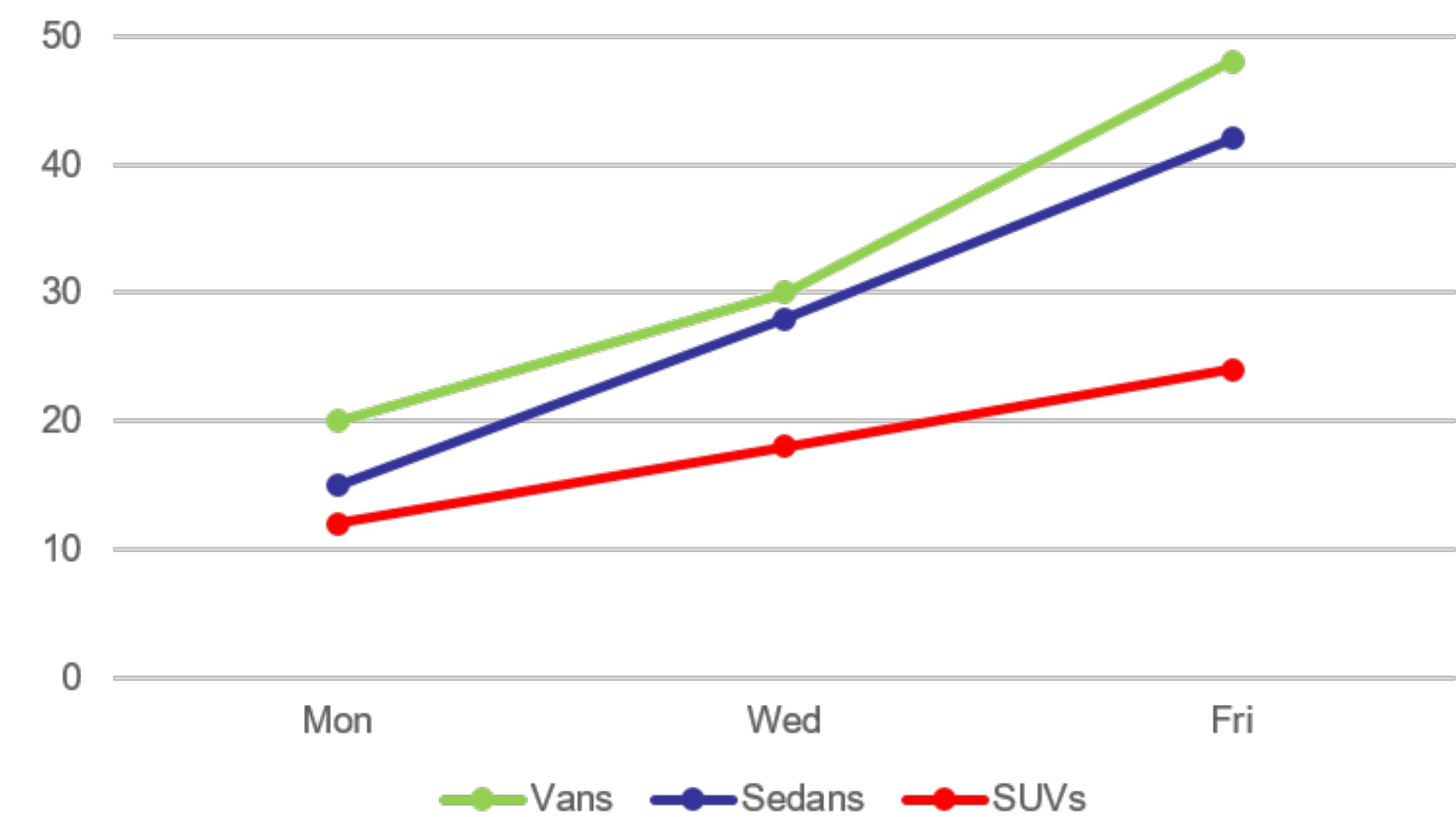
**Example line graphs:**

### Weekly Sales



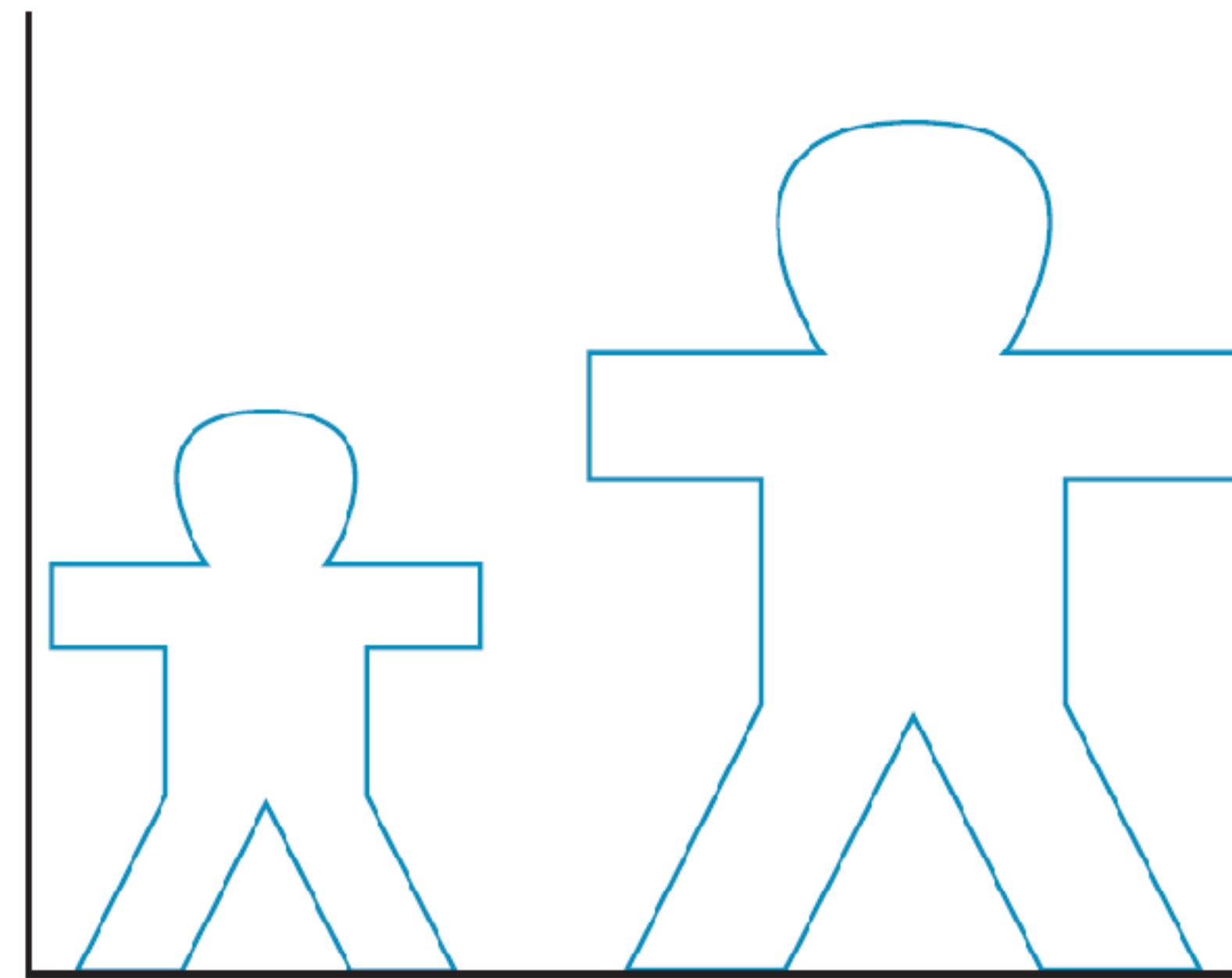
**Accurate:** “This week’s van and SUV sales were erratic.”

### Weekly Sales

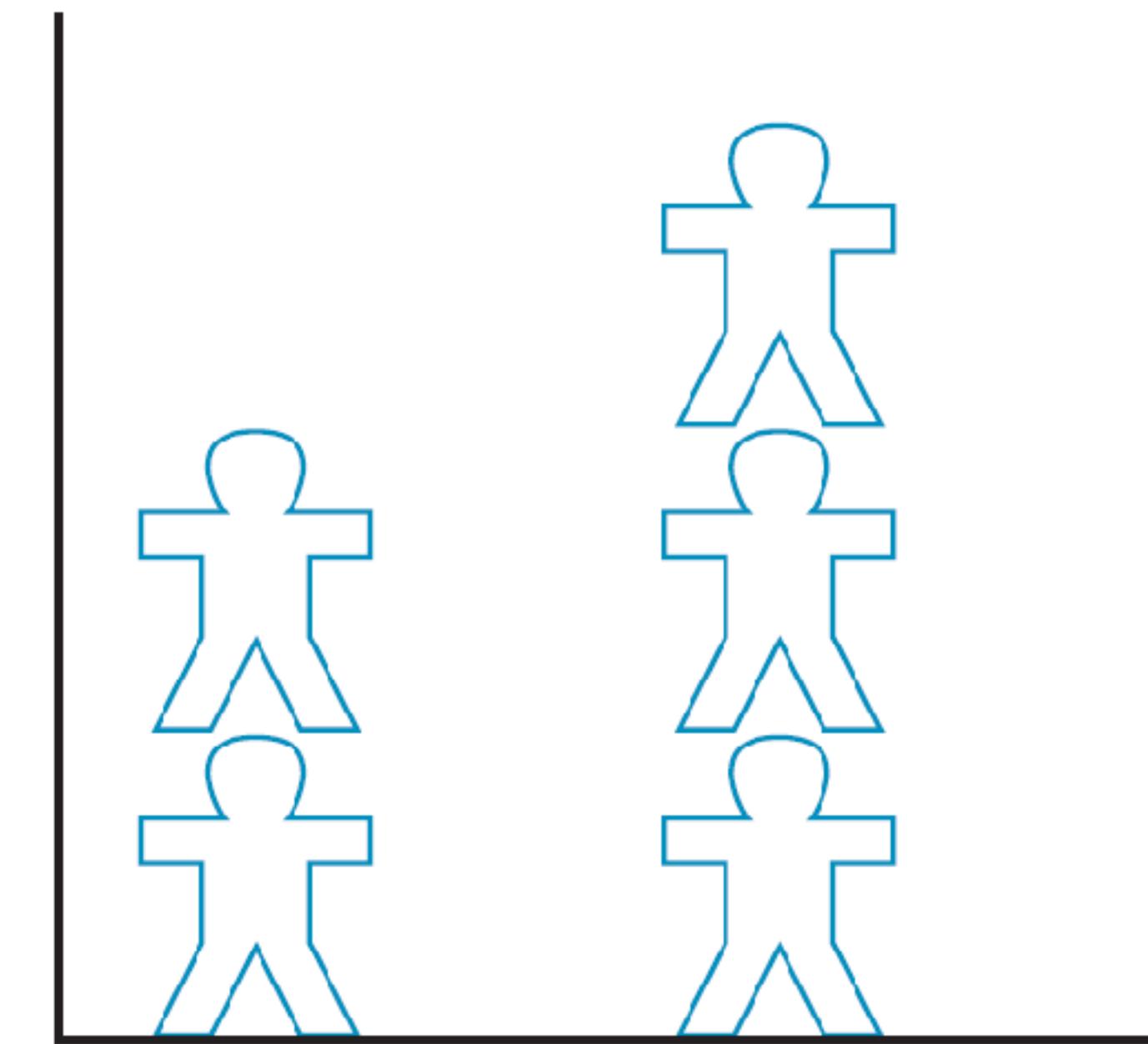


**Distorted:** “This week’s sales in all areas increased steadily.”

**Example pictorial graph:**

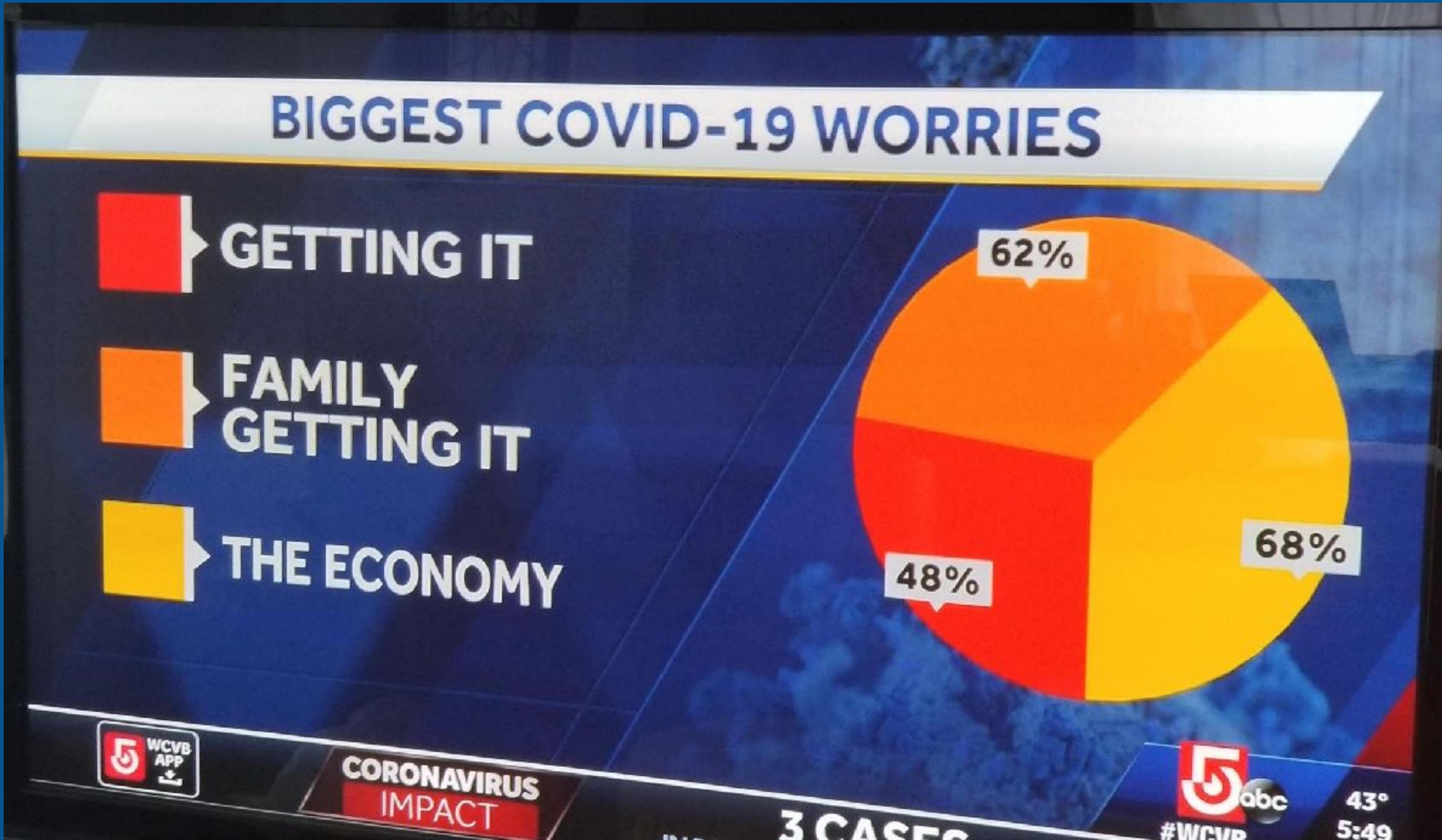


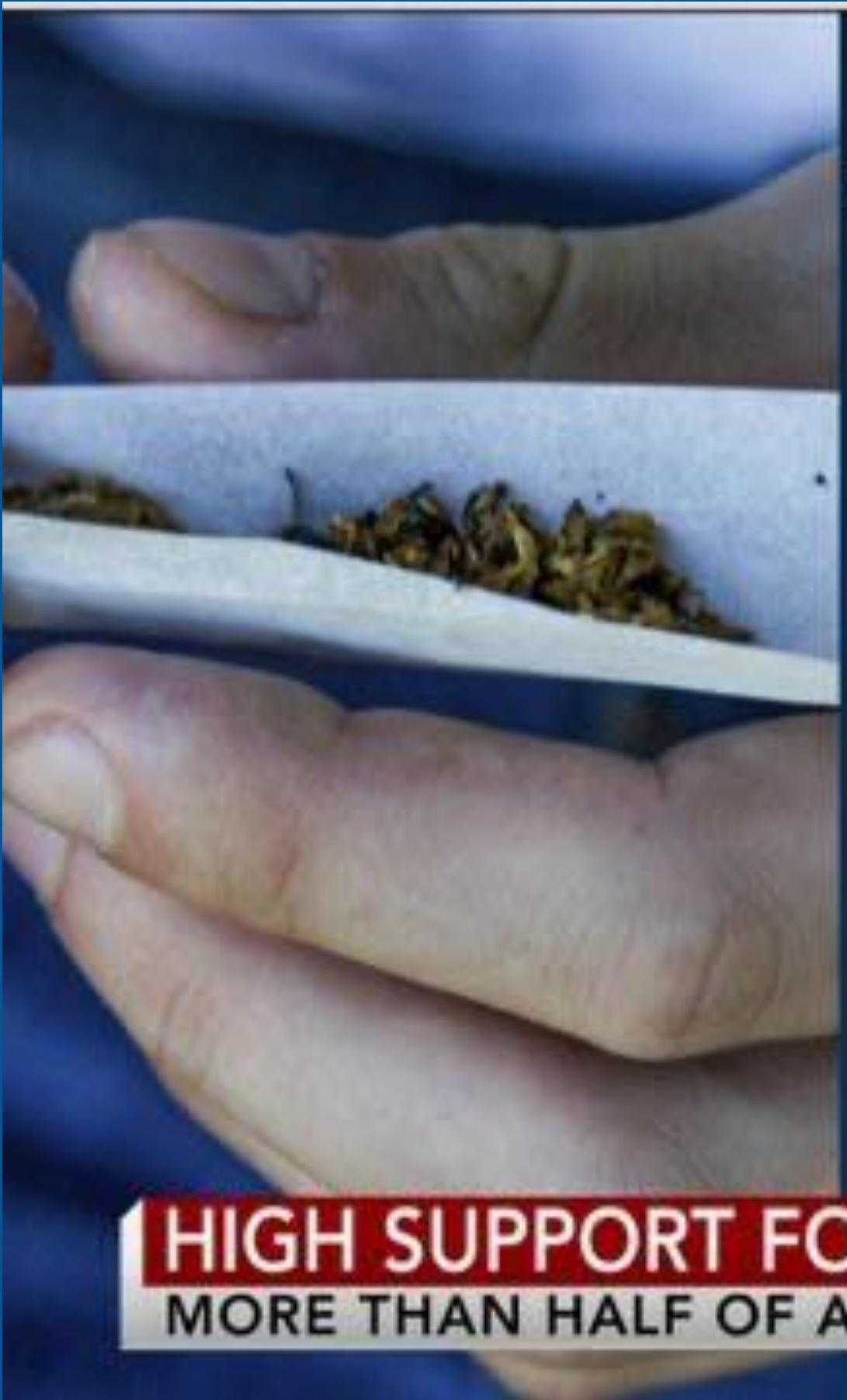
**Overstated**



**Accurate**

**Example pie charts:**





## AMERICANS WHO HAVE TRIED MARIJUANA

CBS NEWS POLL

51%  
TODAY

43%  
LAST YEAR

34%  
1997



Source: MOE +/- 4%

HIGH SUPPORT FOR LEGALIZING MARIJUANA  
MORE THAN HALF OF AMERICANS SAY THEY'VE TRIED POT

LIVE  
 CBSN

# *How to Spot a Misleading Graph*

Video by Lea Gaslowitz for TED-Ed



Kahoot!

ANY QUESTIONS?