

# Analytical Tools

## AGENDA

- FLOW CHART SYMBOLS
- CHARTS FOR REPORTS
- DECISION MATRIX
- PROJECT PLANNING CHARTS

# FLOW CHART




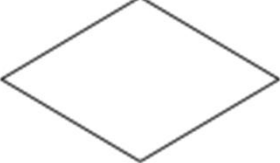
○Flowcharts are used in designing and documenting complex processes or programs. Like other types of diagrams, they help visualize what is going on and thereby help the viewer to understand a process, and perhaps also find flaws, bottlenecks, and other less-obvious features within it.

# FLOW CHART SYMBOLS





## COMMONLY USED SYMBOLS FOR FLOW CHARTS

- TERMINAL
- PROCESSING
- INPUT/OUTPUT
- DOCUMENT
- DECISION

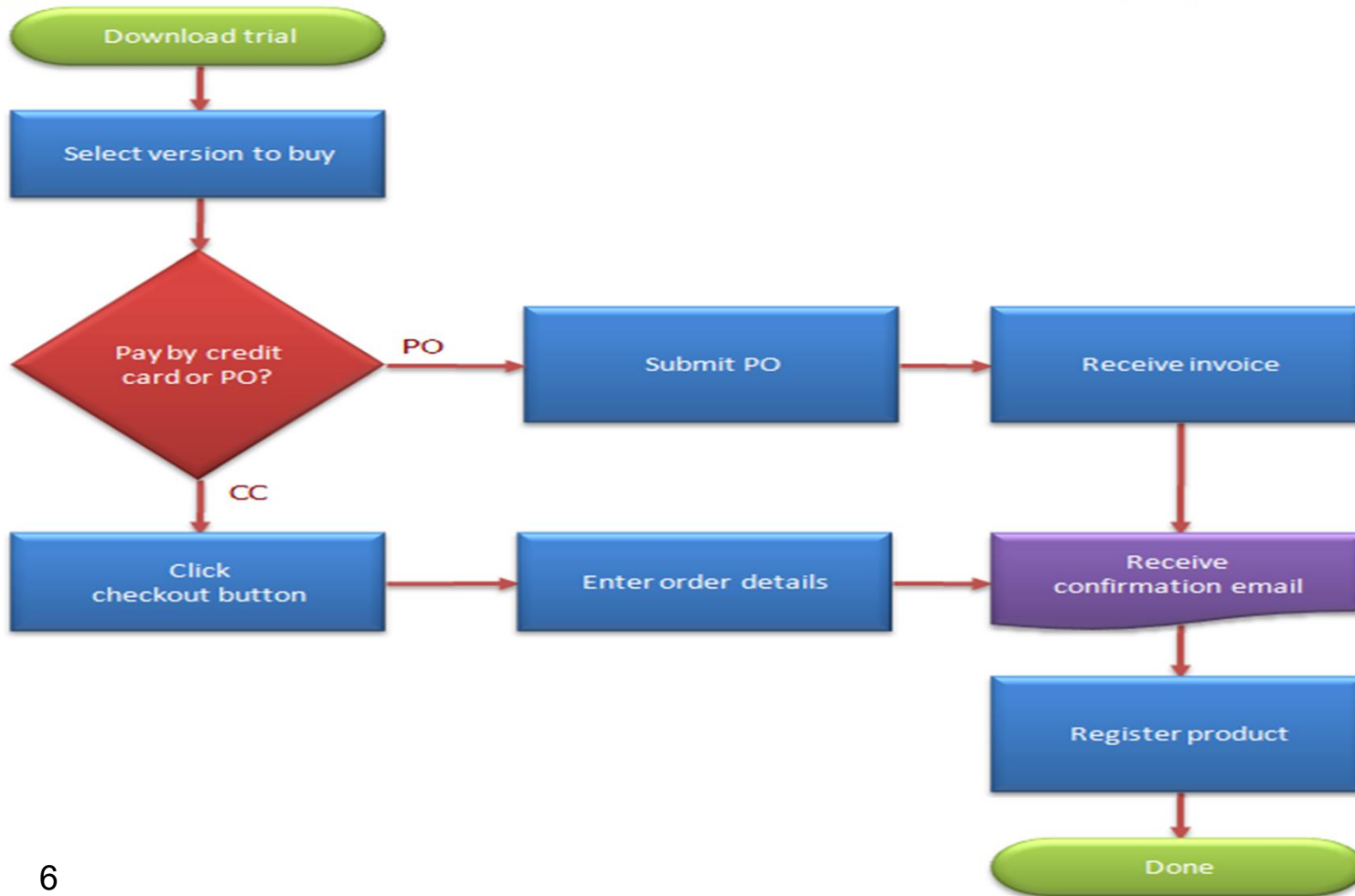
# FLOW CHART SYMBOLS

Some Common Flowchart Symbols		
Symbol	Represents	Purpose
	Terminal	Used to indicate the start and end of a flowchart. Flow begins or terminates here.
	Processing	Used whenever data is being manipulated.
	Document	Used to indicate that a hard copy is generated.
	Decision	Used to represent operations in which there are two possible alternatives. One flow line enters and two flow lines exit. (Labeled <b>Yes</b> and <b>No.</b> )

# FLOW CHART SYMBOLS

	Predefined Process	Used to identify an operation that is more fully described in a separate flowchart segment.
	On-page connector	Used to go to another point on the same page.
	Off-page connector	Used to go to another point on a different page.
	Data	Input or Output of data.

# EXAMPLE OF A FLOWCHART



# COMMONLY USED Charts

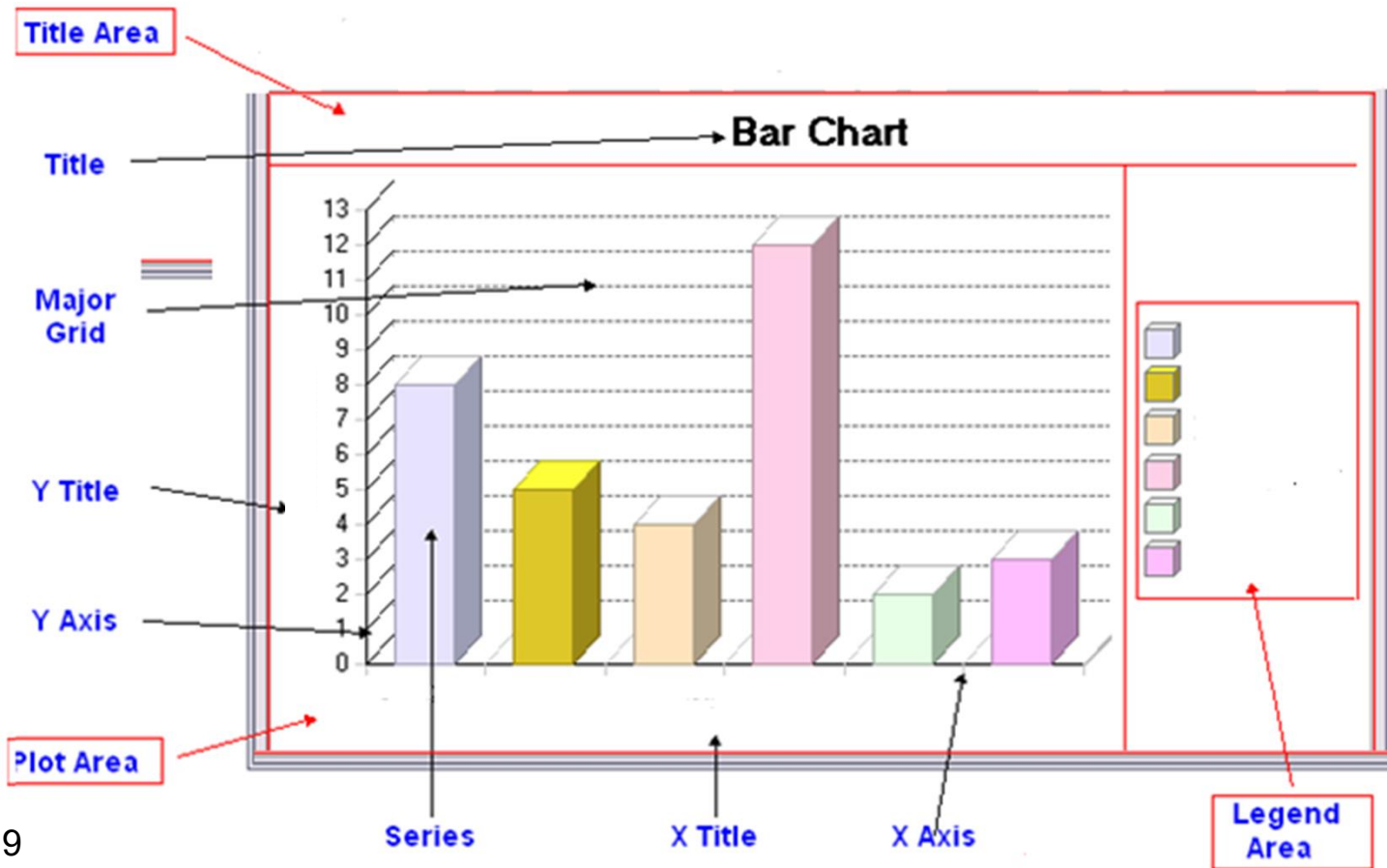
- **Bar**
- **Line**
- **Pareto**

# BAR Chart

- Bar charts compare the data for the same item at specific intervals of time.
- The height of each column is used to represent each respective quantity and demonstrate how the quantities vary from time period to time period.
- Consistent time intervals should be used.



# BAR Chart



# BAR Chart

## Directions

Electric companies usually include bar graphs in their bills to show how much electricity you've used every day or every month. See what you can figure out from this graph.

### Average Daily Electric Use

■ = Actual   ■ = Estimated



Each letter stands for the name of a month, beginning with July

Daily Averages

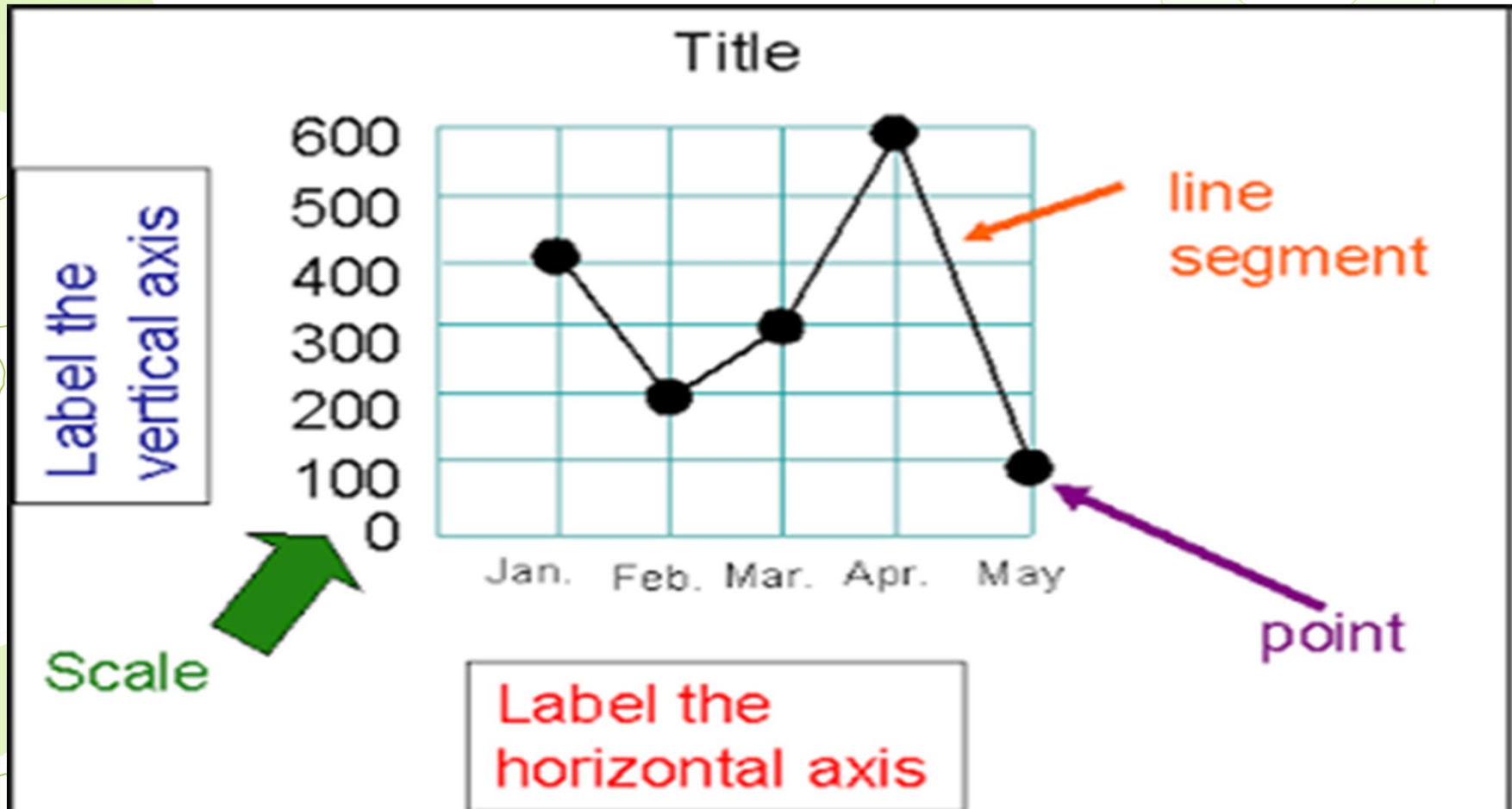
In which month was the most electricity used on an average day?

- October
- July
- May
- June

# LINE Chart

- Line charts effectively show trends and time series data by showing one item at different points in time as a single, unbroken line.
- Multiple lines show on a single chart, but each line must be clearly distinguishable from the other lines through the use of patterns or color.
- A good rule of thumb is to place no more than four lines on a single chart.

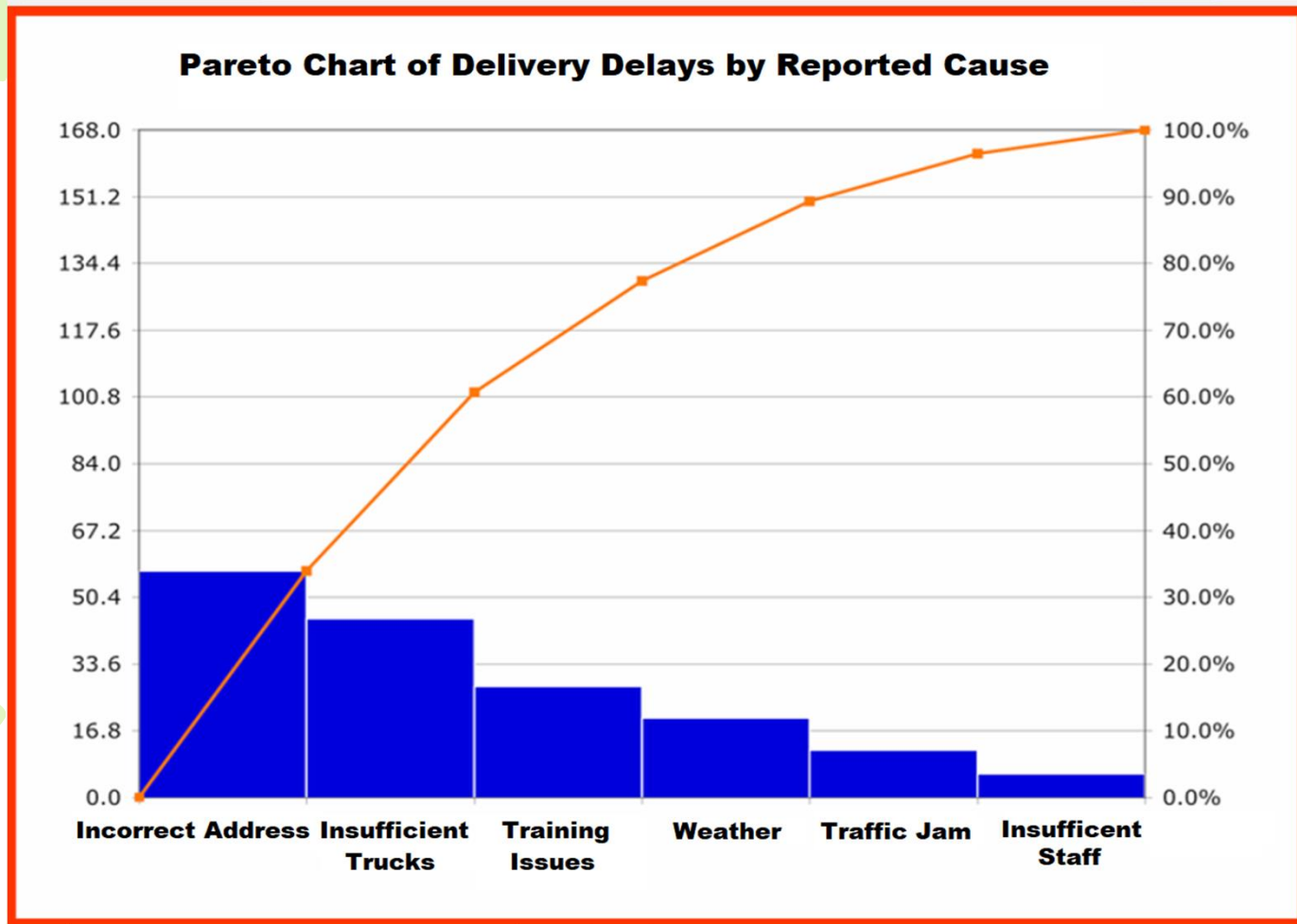
# LINE CHART



# Pareto Chart

- A **Pareto chart** is a type of chart that contains both bars and a line graph, where individual values are represented in descending order by bars, and the cumulative total is represented by the line.

# Pareto Chart





## The questions the Pareto Chart Answers

- What are the biggest issues facing our team?
- As a rule of thumb 20% of the issues are causing 80% of the problems (80/20 rule)
- Where should we focus our efforts to achieve the greatest improvements?

# DECISION MATRIX

- A decision matrix is a chart that allows a team or individual to systematically identify, analyze, and rate the strength of relationships between sets of information. The matrix is especially useful for looking at large numbers of decision factors and assessing each factor's relative importance.
- A decision matrix is frequently used during quality planning activities to select product/service features and goals and to develop process steps and weigh alternatives. For quality improvement activities, a decision matrix can be useful in selecting a project, in evaluating alternative solutions to problems, and in designing remedies.



# Decision Matrix

	<i>Criterion A</i>	<i>Criterion B</i>	<i>Criterion C</i>	<i>Criterion D</i>	<i>Total Benefit</i>
<b>Solution 1</b>					
<b>Solution 2</b>					
<b>Solution 3</b>					
	<b>Criteria Weights</b>				

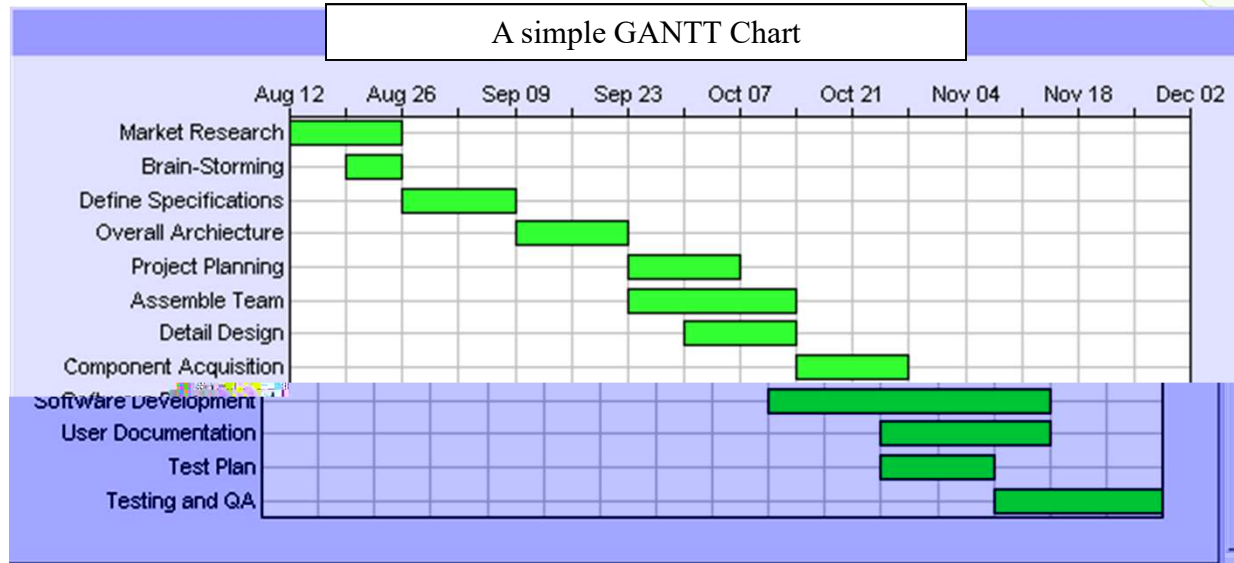
# Decision Matrix

	Cost of building	Parking Space	Security	Room for expansion		Total Benefits
Facility A	5	0	2	5	$1 + 0 + 0.5 + 2 = 3.5$	<b>3.5</b>
Facility B	3	3	2	4	$0.6 + 0.45 + 0.5 + 1.6 = 3.15$	<b>3.15</b>
Facility C	3	1	1	3	$0.6 + 0.15 + 0.25 + 1.2 = 2.2$	<b>2.2</b>
Facility D	2	1	1	1	$0.4 + 0.15 + 0.25 + 0.40 = 1.2$	<b>1.2</b>
	.20	.15	.25	.40		

# GANTT Chart

- Definition: A Gantt chart is used to show activities displayed against time.
- On the left of the chart is a list of activities and along the top is a time scale of hours, days, months, etc,- whatever unit is most suitable.

# GANTT Chart

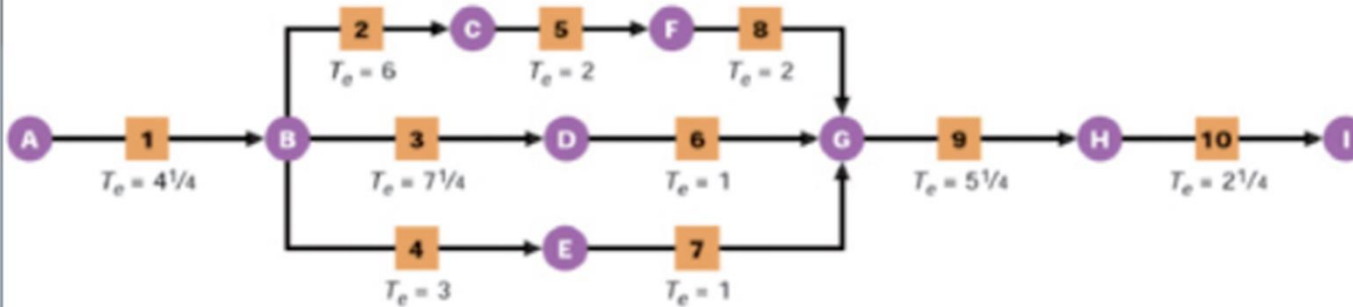


# PERT

- A PERT Chart shows the relationship among various steps in a project. It also serves as a way to calculate the critical path.
- The critical path is the longest time path through the network of steps. It identifies essential steps that must be completed on time in order to not delay completion of the total project.

# PERT

**TASK: Build three dozen customized golf carts for use by physically challenged adults**



PERT events	
A.	Receive contract
B.	Begin construction
C.	Receive parts
D.	Bodies ready for testing
E.	Frames ready for testing
F.	Drive trains ready for testing
G.	Components ready for assembly
H.	Carts assembled
I.	Carts ready for shipment

PERT activities and times				
Activities	$T_o$	$T_m$	$T_p$	$T_e^*$
1. Prepare final design	3	4	6	$4\frac{1}{4}$
2. Purchase parts	4	5	12	6
3. Fabricate bodies	5	$7\frac{1}{2}$	9	$7\frac{1}{4}$
4. Fabricate frames	$2\frac{1}{2}$	3	4	3
5. Build drive trains	$1\frac{1}{2}$	2	3	2
6. Test bodies	$\frac{1}{2}$	1	$1\frac{1}{2}$	1
7. Test frames	$\frac{1}{2}$	1	$1\frac{1}{2}$	1
8. Test drive trains	1	$1\frac{1}{2}$	5	2
9. Assemble carts	3	5	9	$5\frac{1}{4}$
10. Test carts	1	2	5	$2\frac{1}{4}$

\*Rounded to nearest  $\frac{1}{4}$  workday

## PERT

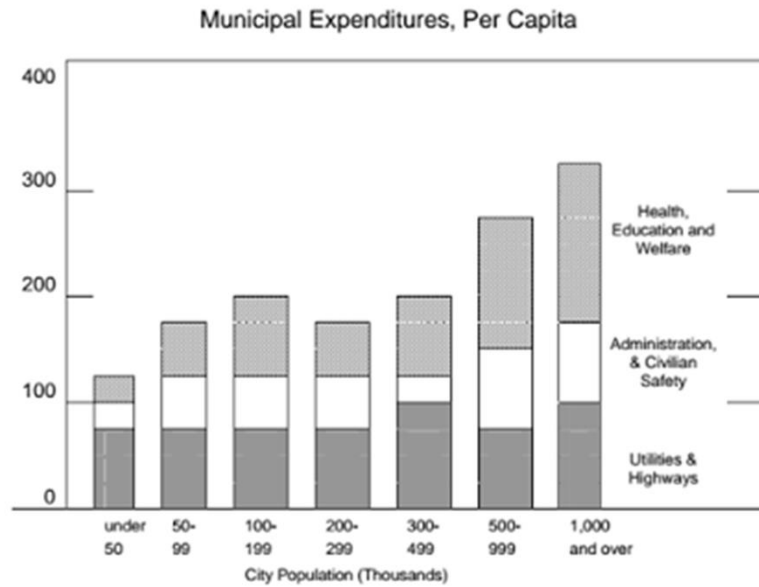
Enables a manager to:

- plan the best possible use of resources to achieve a given goal within the overall time and cost limitations.
- handle one-of-a-kind programs where it is not known exactly how long things will take -- as opposed to repetitive production situations.
- utilize a so-called “time network analysis” as a basic method of approach to determine manpower, material, and capital requirements.

# REVIEW QUESTIONS



# SAMPLE TEST QUESTIONS



Using the chart above, what is the approximate municipal expenditure per capita in cities having populations of 200,000 to 299,000?

- a. \$ 125
- b. \$ 175
- c. \$ 200
- d. \$ 300



**Instructions:**

Read the information provided in the following passage and answer the question that follows.

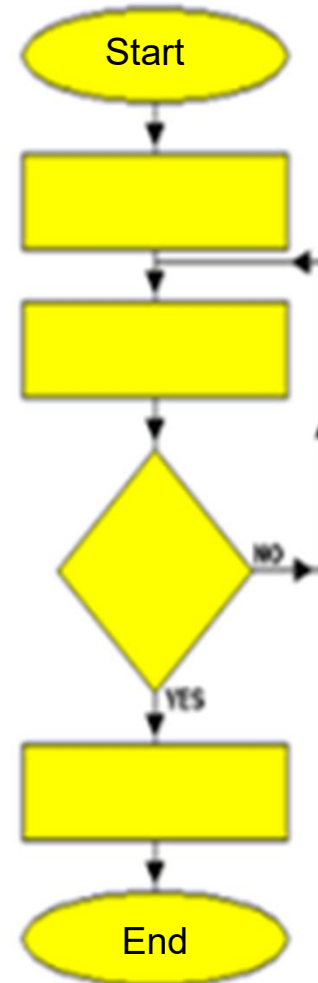
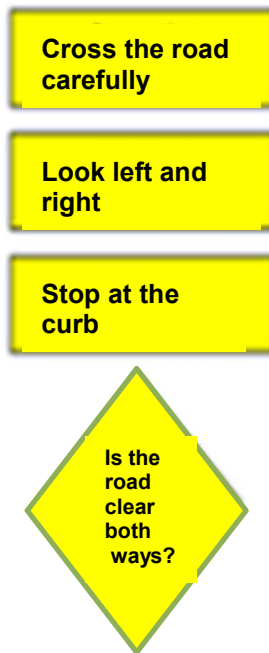
- ( From time to time the State makes surplus property available for sale to the public. This property consists of State property; unclaimed or abandoned personal property and valuables, except those confiscated in conjunction with drug enforcement activities; and unclaimed stolen property. The surplus property is disposed of through sale bids, auctions and donations.

According to the passage,

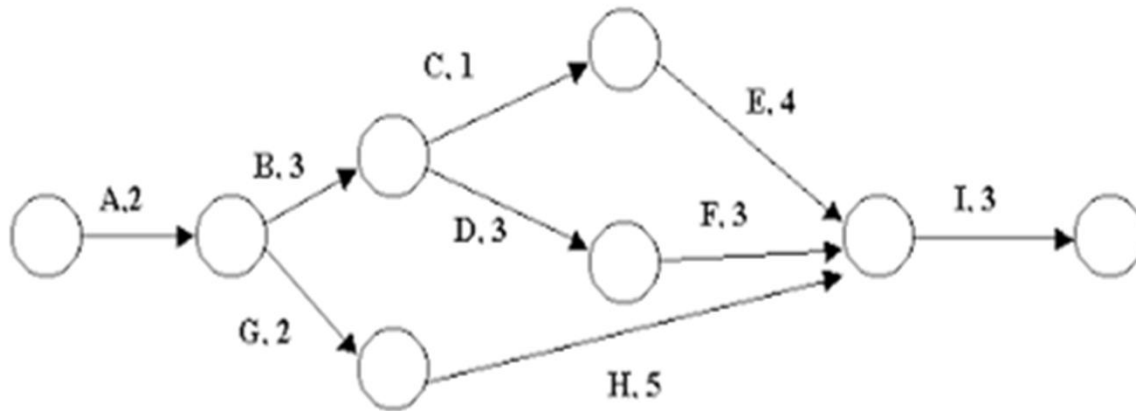
- a. the State's personal property brings in the largest sales.
- b. items that are not claimed by their owner will be sold to the public.
- c. the State holds regularly scheduled sales of property to the public.
- d. property obtained by drug enforcement activities is sold through the bid process.

The flow chart on the right is meant to show the steps for safely crossing the road. There is a decision box in the flow chart.

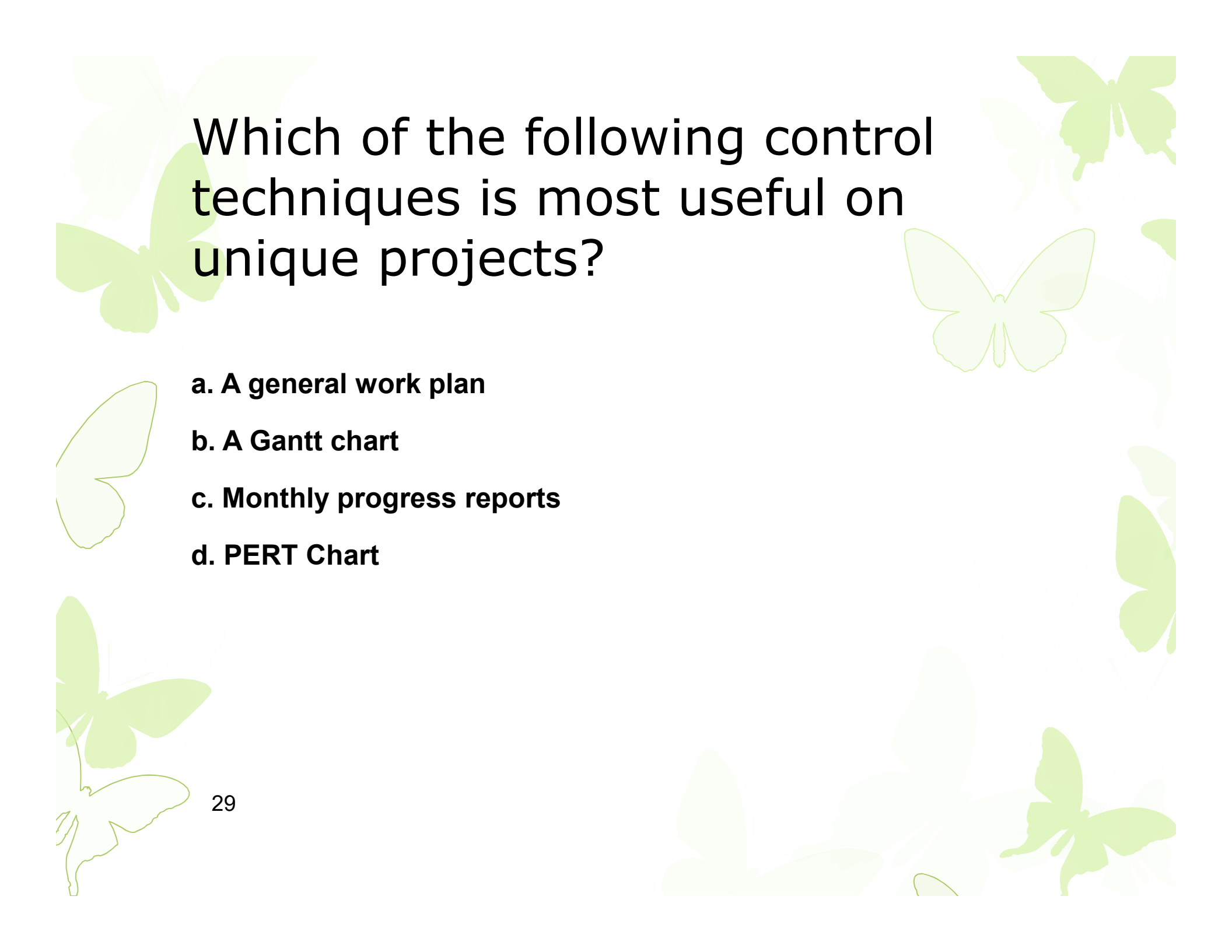
Place the boxes below in the flow chart



Below is a PERT chart drawn to show the development of a system.



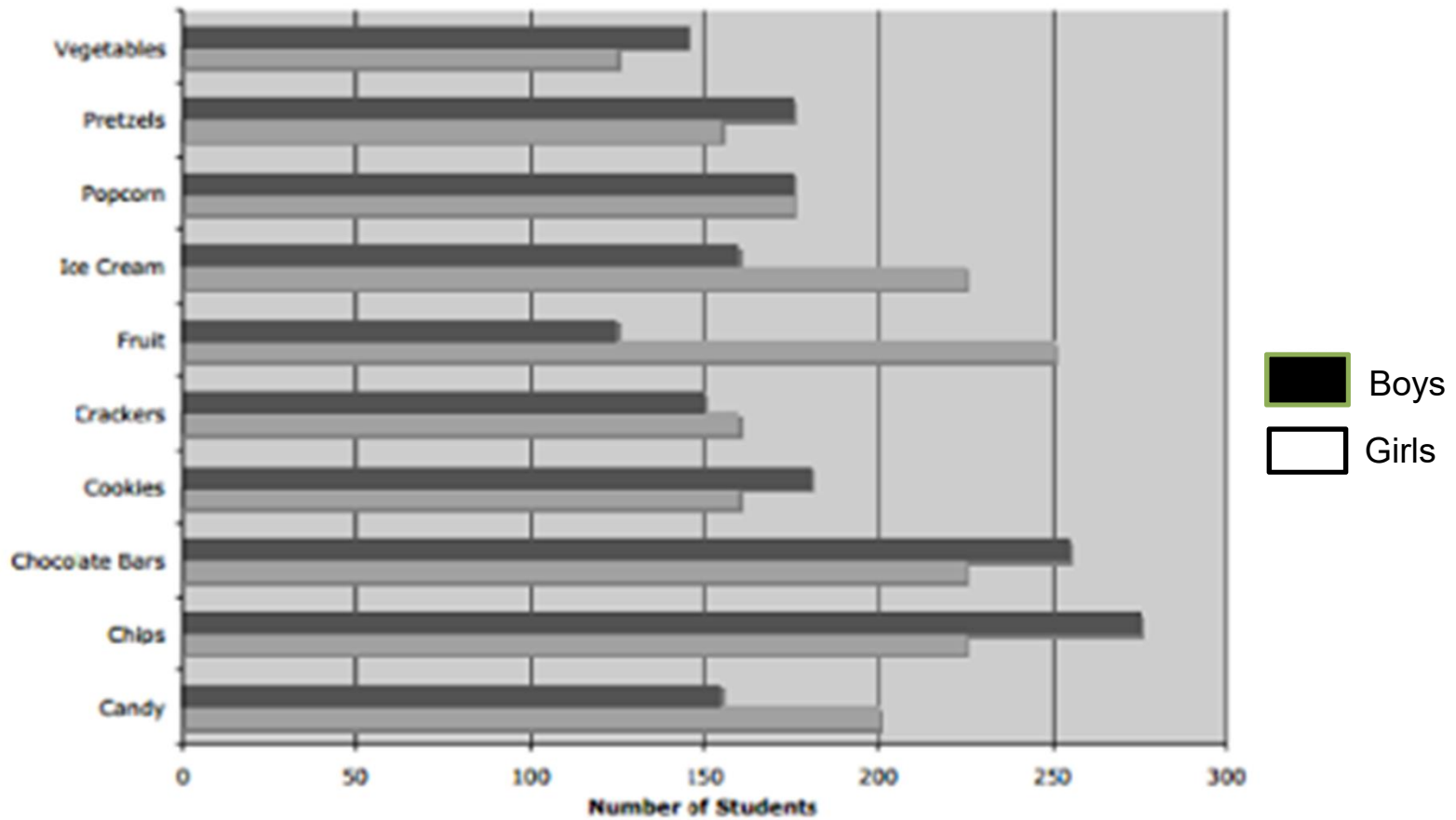
Which tasks are on the critical path of the PERT chart



Which of the following control techniques is most useful on unique projects?

- a. A general work plan**
- b. A Gantt chart**
- c. Monthly progress reports**
- d. PERT Chart**

### Preferred snack choices of students at St. Johns High School

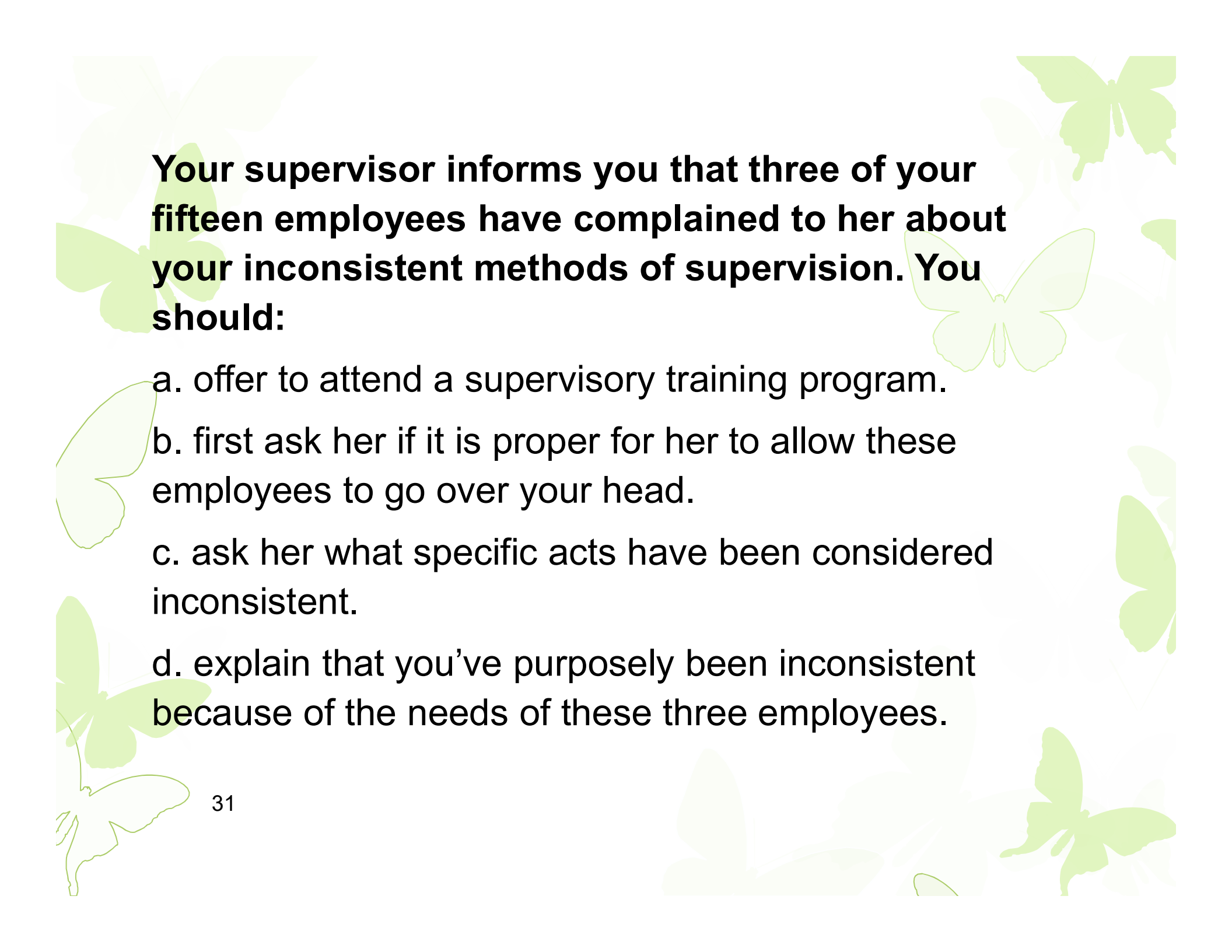


Q1. What ratio of category preferences did the boys exceed the girls in?

1. 4:5    2. 5:4    3. 1:1    4. 5:5

Q2. Approximately how many students had snacks at the school?

1. 3700    2. 1500    3. 600    4. 275

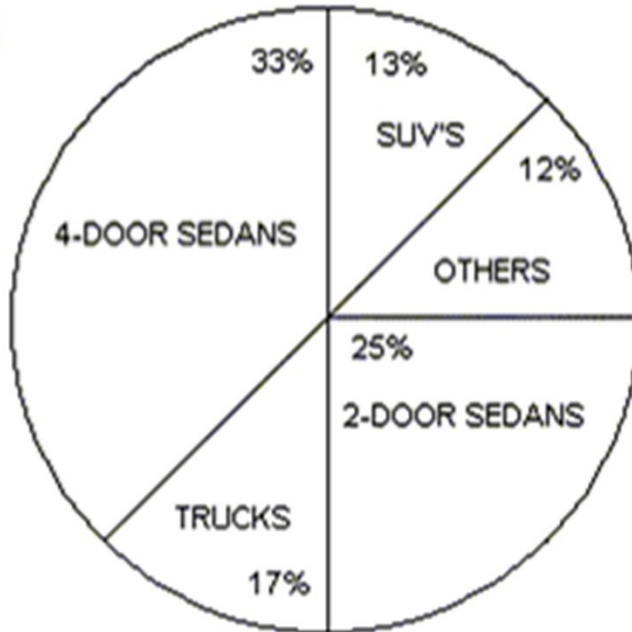


**Your supervisor informs you that three of your fifteen employees have complained to her about your inconsistent methods of supervision. You should:**

- a. offer to attend a supervisory training program.
- b. first ask her if it is proper for her to allow these employees to go over your head.
- c. ask her what specific acts have been considered inconsistent.
- d. explain that you've purposely been inconsistent because of the needs of these three employees.

If XYZ Auto Company sold 23,000 vehicles in 1999, how many were SUV's?

Percentage of Vehicle Types that XYZ  
Auto Company sold in 1999



- A. 2,990
- B. 3,030
- C. 3,450
- D. 4,760
- E. 4,775





PERT is a system developed primarily to

- a. Evaluate the quality of a project
- b. Analyze and control the timing aspects of a major project
- c. Control the total expenditure of agency funds within a monthly or quarterly time period
- d. Analyze and control the differential effect on cost of purchasing in different quantities

## **ADDENDUM**

Under Mayoral Executive Order no. 16

- 1 \_\_\_\_\_ The Inspector General for each agency reports directly to the commissioner for that agency.
- 2 \_\_\_\_\_ The Inspector General has unrestricted access to all regular meetings of agency executive and managerial staff.
- 3 \_\_\_\_\_ The Inspector General is prohibited from promotion into managerial and executive positions within the agency to which they are assigned.
- 4 \_\_\_\_\_ Agency heads submit their own annual performance evaluation of the resident Inspector General based on the agreed upon tasks and standards to the IG Commissioner.
- 5 \_\_\_\_\_ The Mayor or an agency head may direct that the employment on any person be subject to a background check by the Department of Investigation.
- 6 \_\_\_\_\_ The Inspector General of each agency is notified of the disposition of formal disciplinary hearings.
- 7 \_\_\_\_\_ The Standards of Conduct issued by each agency are consistent across agencies.