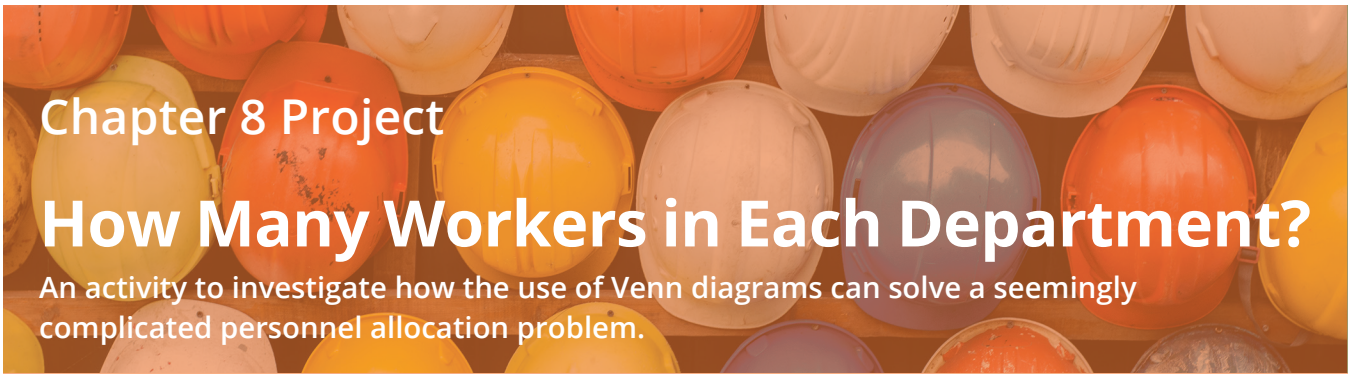


Chapter 8 Project

How Many Workers in Each Department?

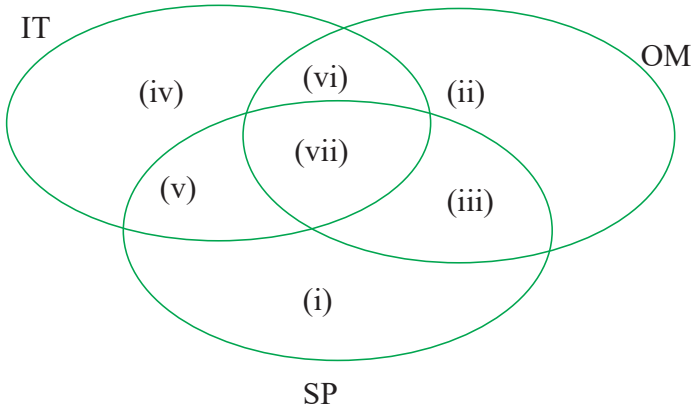
An activity to investigate how the use of Venn diagrams can solve a seemingly complicated personnel allocation problem.

According to a job-searching website, "analytical skills are in demand in many industries and are commonly listed requirements in job descriptions. Analytical thinking can help you investigate complex issues, make decisions and develop solutions." [1]

One of the main qualities of an analytical thinker is having the ability to translate a real-world problem into a mathematical model, solve the problem, and communicate the answer clearly. In this project you will use your analytical skills to determine how many employees are needed in each department of a company.

As the human resources manager for the small but mighty tech company Boogle, you have the responsibility to determine how many employees are necessary in each of the company's three technical departments: Online Marketing (OM), Information Technology (IT), and Special Projects (SP). Due to the multi-disciplinary nature of the work done at Boogle, the same employee might be required to work ***in more than one*** *department.*

The three-set Venn diagram in Figure 1 shows all the possible departmental intersections at Boogle.



1. Complete the table below with the diagram's region numbers and their respective descriptions.

Description	Region
Employees who work in SP only	i
	ii
Employees who work in IT only	iv
Employees who work in SP and IT, but not in OM	
Employees who work in SP and OM, but not in IT	iii
	vi
Employees who work in all three departments	

1 "Analytical Skills: Definitions and Examples" Indeed, accessed September 26, 2019, https://www.indeed.com/career-advice/resumes-cover-letters/analytical-skills.

2. Now, consider the executive board requirements:

   - The total number of employees in the three technical departments must be exactly 20.
   - There must be exactly 8 employees in Information Technology and exactly 10 employees in Online Marketing.
   - No employee works in Information Technology and Online Marketing without also being in Special Projects.
   - There must be exactly 4 employees working in both Online Marketing and Special Projects.
   - Exactly 2 employees will be required to work in Special Projects and Online Marketing but not in Information Technology

   Exactly one employee works in Information Technology and Special Projects but not in Online Marketing.

   Use the Venn diagram and these requirements to determine how many employees should be in each department. Clearly state how many employees work in more than one department.

3. The company decides to add a new technical department named Digital Outreach (DO). This department can only share employees with Online Marketing. Draw a four-set Venn diagram that models this situation.

4. After adding the Digital Outreach department, the total number of employees increased to 25. Knowing that 3 people work at DO only, determine how many employees now work in DO and OM at the same time. Did the total number of employees in OM change? Explain your reasoning.