Red Zuma Project

The ARC Company specializes in developing and selling a wide range of high-quality scooters. Sales representatives report that there is a growing demand for racing scooters. ARC's president, Robin Lane, is excited about the possibilities and predicts that one day these kinds of razor scooters will be featured in X-Game events. ARC is a small company and uses a strong matrix to optimally utilize limited manpower.

The Project Priority Matrix for the Red Zuma Project is:

	Time	Scope	Cost
Constrain		X	
Enhance	X		
Accept			X

Part 1

You are a member of a project team assigned to develop the new razor scooter code named "Red Zuma." Table A2.5 contains the information necessary to create a project schedule. For the purpose of this case assume the following:

1. The project begins January 2, 2015.
2. The following holidays are observed: January 1, Martin Luther King Day (third Monday in January), Memorial Day (last Monday in May), July 4th, Labor Day (first Monday in September), Thanksgiving Day (4th Thursday in November), December 25.
3. If a holiday falls on a Saturday, then Friday will be given as an extra day off, and if it falls on a Sunday, then Monday will be given as a day off. If December 25th falls on a Friday then Monday will not be given a day off.
4. The project team works eight-hour days, Monday through Friday.

TABLE A2.5
Red Zuma: Project Schedule

ID	Task Name	Duration	Predecessors
1	**1 Red Zuma Project**	260 days	
2	1.1 Market Analysis	25 days	
3	1.2 Product Design	30 days	2
4	1.3 Manufacturing Study	20 days	2
5	1.4 Product Design Selection	10 days	3, 4
6	1.5 Detailed Marketing Plan	15 days	5
7	1.6 Manufacturing Process	30 days	5
8	1.7 Detailed Product Design	45 days	5
9	1.8 Build Prototypes	25 days	8
10	1.9 Lab Test Prototypes	10 days	9
11	1.10 Field Test Prototypes	15 days	9
12	1.11 Finalized Product Design	20 days	7,10,11
13	1.12 Final Manufacturing Process	10 days	12
14	1.13 Order Components	7 days	12
15	1.14 Order Production Equipment	14 days	13
16	1.15 Install Production Equipment	35 days	14FS+20 days,15FS+30 days
17	1.16 Celebrate	1 days	6, 16

Note: FS refers to a Finish-to-Start lag.

Construct a network schedule for this project and prepare a memo that answers the following questions:

1. When is the project estimated to be completed? How long will the project take?
2. What is the critical path for the project?
3. Which activity has the greatest amount of slack?
4. How sensitive is this network?
5. Identify two sensible milestones and explain your choices.

Include the following printouts:

- A Gantt chart.
- A network diagram highlighting the critical path.
- A schedule table reporting ES, LS, EF, LF, and slack for each activity.

Part 2

The following personnel have been assigned full-time to the Red Zuma project team:

4 marketing specialists
4 design engineers
4 development engineers
4 industrial engineers
4 test riders
2 purchasing agent

Use the file from Part 1 and the information contained in Tables A2.6 and A2.7 to assign resources to the project schedule.

TABLE A2.6
Red Zuma Project Resources

	$	Number available
Marketing specialist	$80,000/yr	4
Design engineer	$125,000/yr	4
Development engineer	$110,000/yr	4
Industrial engineer	$100,000/yr	4
Purchasing agent	$75,000/yr	2
Test rider	$70/hr	4

Note: MS Project considers resources in terms of percentages with one full-time worker being 100%.

TABLE A2.7 Red Zuma Resource Assignments

Task Name	Resource Names
Red Zuma Project	
Market Analysis	Marketing Specialist [400%]
Product Design	Marketing Specialist, Design Engineer [400%], Development Engineer [200%], Industrial Engineer, Purchasing Agent
Manufacturing Study	Industrial Engineer [400%], Development Engineer [200%]
Product Design Selection	Marketing Specialist [200%], Design Engineer [300%], Development Engineer [200%], Industrial Engineer [200%], Purchasing Agent [25%]
Detailed Marketing Plan	Marketing Specialist [400%]
Manufacturing Process	Design Engineer, Development Engineer [200%], Industrial Engineer [300%]
Detailed Product Design	Marketing Specialist [200%], Design Engineer [400%], Development Engineer [200%], Industrial Engineer [200%], Purchasing Agent [25%]
Build Prototypes	Design Engineer [200%], Development Engineer [200%], Industrial Engineer [400%]
Lab Test Prototypes	Design Engineer [200%], Development Engineer [200%], Test Rider
Field Tests	Marketing Specialist, Design Engineer [200%], Development Engineer, Industrial Engineer, Test Rider [300%]
Finalized Product Design	Marketing Specialist [200%], Design Engineer [300%], Development Engineer [300%], Industrial Engineer [200%], Purchasing Agent [25%]
Final Manufacturing Process	Industrial Engineer [300%], Design Engineer, Purchasing Agent [25%]
Order Components	Purchasing Agent
Order Production Equipment	Purchasing Agent
Install Production Equipment	Design Engineer, Development Engineer [300%], Industrial Engineer [400%]
Celebration	Design Engineer [400%], Development Engineer [400%], Industrial Engineer [400%], Marketing Specialist [400%], Purchasing Agent [200%]

Note: Resource assignments without brackets is 100%.

Part A

Prepare a memo that addresses the following questions:

1. Which if any of the resources are overallocated?
2. Assume that the project is time constrained and try to resolve any overallocation problems by leveling within slack. What happens?
3. What is the impact of leveling within slack on the sensitivity of the network?

Include a Gantt chart with the schedule table after leveling within slack.

4. Assume that the project is resource constrained and no additional personnel are available. How long will the project take given the resources assigned? (Hint: Undo leveling performed in Part A before answering this question.)

Note: No splitting of activities is allowed.

5. How does the new duration compare with the estimated completion date generated from Part 1? What does this tell you about the impact resources can have on a schedule?

Include a Gantt chart with a schedule table displaying free and total slack depicting the resource-constrained schedule.

Part B

Top management is not happy with the resource-constrained schedule. Robin Lane, the president, has promised retailers that ARC will begin production in time for the major trade show in Las Vegas on January 22, 2016, which means the project needs to be completed by January 17, 2016. She has authorized working the first available Saturday of each month to help the project get completed sooner. She realizes that this will only reduce the project duration by 12–13 days.

After talking to the engineers, everyone agrees that they do not have to wait for the Detailed Product Design to be 100% completed before starting to build the prototype. The consensus is that Building the Prototype can start 30 days after the start of the Detailed Product Design. Likewise the Final Manufacturing Process can start 15 days after the start of Finalized Product Design.

Dewey Martin, director of product development, is also willing to add personnel to the project. He is willing to make available at least one more Development, Design, and/or Industrial Engineer to the project as well as Marketing Specialist. Since there is an acute shortage of personnel at ARC he requests that you only use additional manpower that will help meet the deadline. Your objective is to develop a schedule which will satisfy the deadline with minimum additional resource usage.

Prepare a memo that addresses the following questions:

1. What was the impact of introducing Start-to-Start lags to the schedule and budget?
2. Which, if any additional personnel assignments, would you choose to complete the project before the January 17th deadline? Explain your choices as well as the reasons for not choosing other options.
3. How have these changes affected the sensitivity of the network and the critical path?

Include a Gantt chart with a schedule table displaying free and total slack for the new schedule.

Note: Do not assign new personnel to specific tasks, simply add them to the Resource Sheet. All new personnel are available full time (100%).

At first glance—this appears to be a very complicated, difficult assignment, but if you enter the information correctly, the computer is able to generate the answers with a few simple clicks.

Part 3

Top management has accepted the schedule created at the end of Part 2. Prepare a brief memo that addresses the following questions:

1. How much will the project cost? What is the most expensive activity?
2. What does the cash flow statement tell you about how costs are distributed over the life span of the project?

Include a monthly cash flow for the project.

Once you are confident that you have the final schedule, save the file as a baseline. **Hint:** Save a backup file just in case without baseline!