

## CONCLUSION

The Grade-Weight-Setting Exercise is a dramatic demonstration that the class will be conducted differently from those to which students have previously been exposed. This knowledge, acquired on the first day of class, allows students to make a decision about whether to stay enrolled or not. As a result, we seldom have the problem of the students feeling trapped in a class that offers a curriculum they did not expect.

The exercise is also highly effective in reducing anxiety because the students have the opportunity to understand and accept the grading process. In addition, having teams make and defend decisions about how much of the grade they are willing to assign to the products of their collective effort helps to insure the rapid development of interpersonal support and team cohesiveness.

Over the years, we have discovered that the Grade-Weight-Setting Exercise has a self-correcting feature. For example, anxiety about working as a team dissipates when pressure from other classmates (outside one's own team) causes individual members (within the team) to become more and more cohesive. In fact, almost without exception, teams that are attacked the most vigorously in the Grade-Weight-Setting Exercise turn out to be the most cohesive teams in the class.

Finally, we are convinced the exercise is successful because students learn a great deal about us, the teachers, in the process. During this first class period, we demonstrate that we:

1. have needs of our own that must be satisfied and are willing to openly discuss them;
2. have strong feelings about the importance of the concepts we teach;
3. expect students to work hard developing interpersonal and team skills;
4. care about students as individuals;
5. intend to conduct the class in a way that, to the extent possible, will allow their needs to be met;
6. are confident that the course will be a rewarding experience for students and the instructor alike.

### NOTE

1. This version of the Grade-Weight-Setting Exercise was adapted from Michaelsen, Cragin, & Watson (1981).

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## APPENDIX D

# Miscellaneous Materials Related to Team-Based Learning

This appendix contains a collection of charts, diagrams, and tables that teachers may find useful in a variety of situations. We have grouped these materials into two sets of exhibits:

- A. *Explaining Team-Based Learning to Others*. From time to time, you may feel a need to explain team learning, either to students who are experiencing it for the first time, or to colleagues who need to understand the ideas behind a significantly different way of teaching. These materials present some ideas on how team-based learning works and why it operates the way it does.
- B. *Helpful Forms*. This set contains four forms that may be useful as you are getting started with team-based learning.

Below is a full list of the exhibits. Each numbered exhibit is a separate illustration. The actual exhibits have been numbered sequentially: Exhibit D-A1.1 or Exhibit D-B1.2, and so on.

- A. *Explaining Team-Based Learning to Others*
  1. Comparisons of Traditional Teaching and Team-Based Learning
    1. Course Objectives and Instructional Strategies
    2. Course Objectives and Use of Class Time
    3. The Means by which Students Gain Their Initial Exposure to Content and Learn to Apply Concepts.
  2. How Team-Based Learning Promotes the Learning of Complex Concepts
    1. What Are the Sources of Learning?
    2. Impact of Team-Based Learning on Driving a More Powerful Process

3. Key Course Design Questions—Useful Both for Designing a Course and for Explaining to Students Where the Course is Headed
4. The Sequence of Events in a Team-Based Learning Course
5. The Sequence of Events in the Readiness Assurance Process
6. Criteria for Effective Group Assignments
7. Frequency of RATs and Application Exercises: A Specific Example
8. Effect of "Time in Groups" on "Team Performance"
  1. Team Performance in Relation to Individual Performance
  2. Team Performance and Heterogenous Groups
  3. Individual vs. Team Cumulative RAT Scores

#### B. *Helpful Forms*

1. For the Team Folder
  1. Record of Attendance and Performance
  2. Instructions for Appeals
2. Peer Evaluation Forms
  1. Michaelsen's Form
  2. Fink's Form

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#### EXHIBIT D-A1.1

#### Traditional Teaching Versus Team-Based Learning (TBL)

### Learning Objectives and Instructional Strategies

<u>Learning Objectives</u>	<u>How Objectives Accomplished with: Traditional Teaching</u>	<u>Team-Based Learning</u>
Ensure students' mastery of course subject matter	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Class discussion</li> <li>• Individual study (post-class?)</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-class individual study</li> <li>• Readiness Assurance Process</li> </ul>
Develop students' ability to use course concepts in thinking & problem-solving	<ul style="list-style-type: none"> <li>• Class discussion</li> <li>• Individual exams/projects</li> <li>• Group presentations and/or papers, etc. (outside-class)</li> </ul>	<ul style="list-style-type: none"> <li>• In-class group/team work (problem-based discussion within, then between groups)</li> <li>• Individual exams/projects</li> </ul>
Enhance students' interpersonal and team interaction skills	<ul style="list-style-type: none"> <li>• "Sink or swim" (Since group work is outside class, instructors CAN'T help students learn from their experience working in a group.)</li> </ul>	<ul style="list-style-type: none"> <li>• In-class group/team work (Tasks require cooperation; provide feedback on and rewards for both individual and group performance)</li> </ul>
Prepare students to be lifelong learners	<ul style="list-style-type: none"> <li>• Little or nothing (Mostly countproductive because passive role reinforces student dependency.)</li> </ul>	<ul style="list-style-type: none"> <li>• Active learning (Exposes students to multiple learning strategies; learners become confident &amp; resourceful.)</li> </ul>
Enjoy course	<ul style="list-style-type: none"> <li>• Content well organized</li> <li>• Instructor delivers content with enthusiasm and "style"</li> <li>• Lectures supported by high-quality visuals, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Team assignments that are interesting, relevant and challenging</li> <li>• Immediate feedback</li> <li>• Friendship/social support</li> </ul>

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### Learning Objectives and Instructional Strategies: Relative Time Spent on Different Activities

Note: The type size reflects the amount of class time used for each activity—the larger the type, the greater the class time used.

Learning Objectives	How Objectives Accomplished with:	
	Traditional Teaching	Team-Based Learning
Ensure students' mastery of course subject matter	<ul style="list-style-type: none"> <li>• <b>Lecture</b></li> <li>• Class discussion</li> <li>• Individual study</li> </ul>	<ul style="list-style-type: none"> <li>• Individual study (pre-class)</li> <li>• <b>Readiness Assurance Process</b></li> </ul>
Develop students' ability to use course concepts in thinking & problem-solving	<ul style="list-style-type: none"> <li>• Class discussion</li> <li>• Individual exams/projects</li> <li>• Group work on presentations, papers, etc. (outside-class)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>In-class group/team work</b> (problem-based discussion within, then between groups)</li> <li>• Individual exams/projects</li> </ul>
Enhance students' interpersonal and team interaction skills	<ul style="list-style-type: none"> <li>• "Sink or swim"</li> </ul>	<ul style="list-style-type: none"> <li>• <b>In-class group/team work</b> (Tasks require cooperation; provide feedback on &amp; rewards for both individual &amp; group performance)</li> </ul>
Prepare students to be lifelong learners	<ul style="list-style-type: none"> <li>• [Counterproductive]</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Active learning</b> (Exposes students to multiple learning strategies; learners become confident &amp; competent.)</li> </ul>

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### Means for Accomplishing the Key Educational Tasks Required for Higher-Level Learning

#### Basic Learning Tasks to be Accomplished

1. INITIAL EXPOSURE (develop familiarity with & language to discuss concepts)
2. APPLICATIONS (develop students' ability to USE concepts)

#### Primary Opportunities

- Students working alone
- Instructor and students in class
- Students working in groups

#### Additional Modes\*

- Assistant and students in "lab"
- Students 1-on-1 with instructor
- Students working with mentor

\*These "additional modes" usually increase instructional costs (time and/or \$).

#### Traditional Teaching

##### 1. Initial Exposure to Content

- Instructor and students in class

##### 2. Applications

- Students working alone
- Group assignments outside class (Students working in groups?)
- Assistant and students in "lab"
- Students 1-on-1 with instructor

#### Team-Based Learning

##### 1. Initial Exposure to Content

- Students working alone (pre-class)
- Students working in groups (in-class, i.e., Readiness Assurance Process)

##### 2. Applications

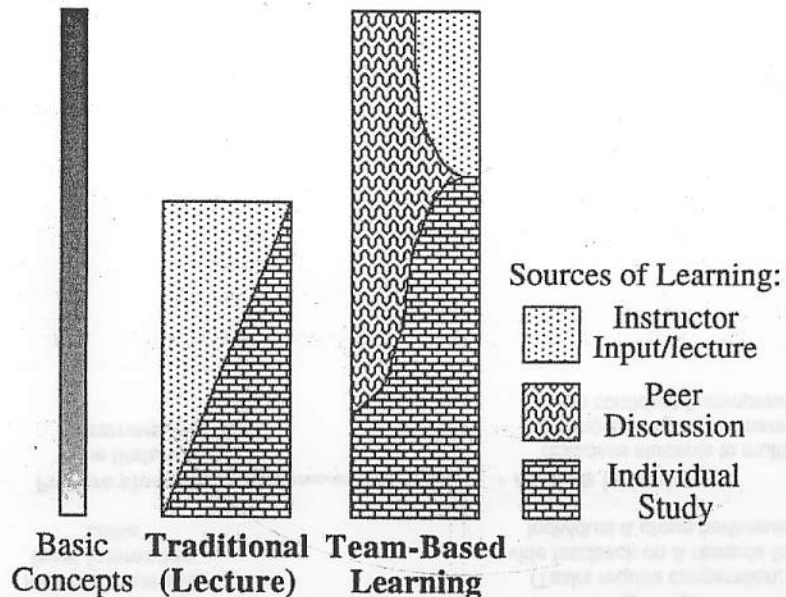
- Students working in groups (in-class)
- Instructor and students in class

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EXHIBIT D-A2.1

Sources of Learning in Relation to Complexity of Concepts

Complex Concepts and Applications



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EXHIBIT D-A2.2

Impact of Team-Based Learning on Driving a More Powerful Learning Process

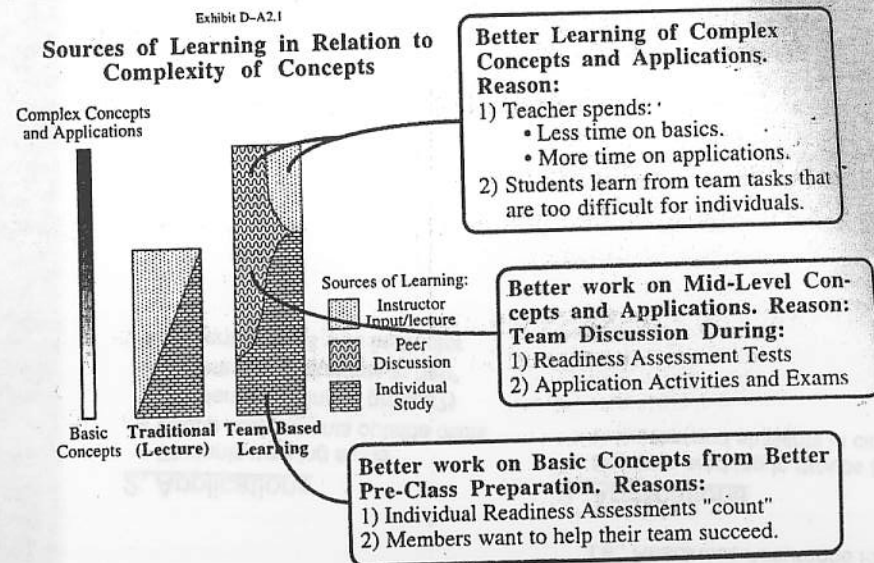


EXHIBIT D-A3  
Key Course Design Questions

1. What do I want students to be able to DO when they have completed this unit of instruction (or course, program, etc.)?
  - This defines the desired outcomes in behavioral terms.
2. What will students have to KNOW to do #1?
  - This defines the content that must be covered in assigned readings or in other ways.
3. How can I ASSESS whether or not students have successfully mastered key course concepts?
  - This guides the selection of questions for the Readiness Assessment Tests (which enable instructors to pinpoint their input/lectures on only the specific points that need further clarification).
4. How can I tell if students will be able to USE their knowledge of key course concepts?
  - This guides the development of projects and exams that require students to use the concepts to solve the same kinds of problems they will face in subsequent course work and/or future jobs.

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EXHIBIT D-A4  
Team-Based Learning Instructional Activity Sequence

(Repeated for each major instructional unit, i.e., 5-7 per course)

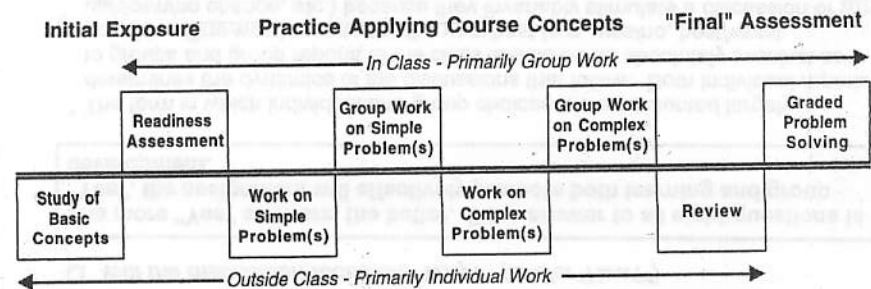
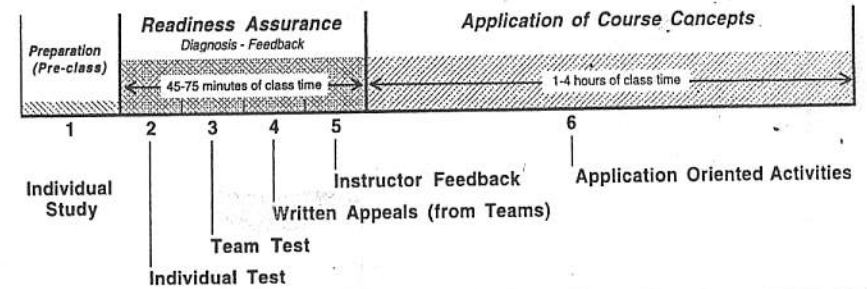
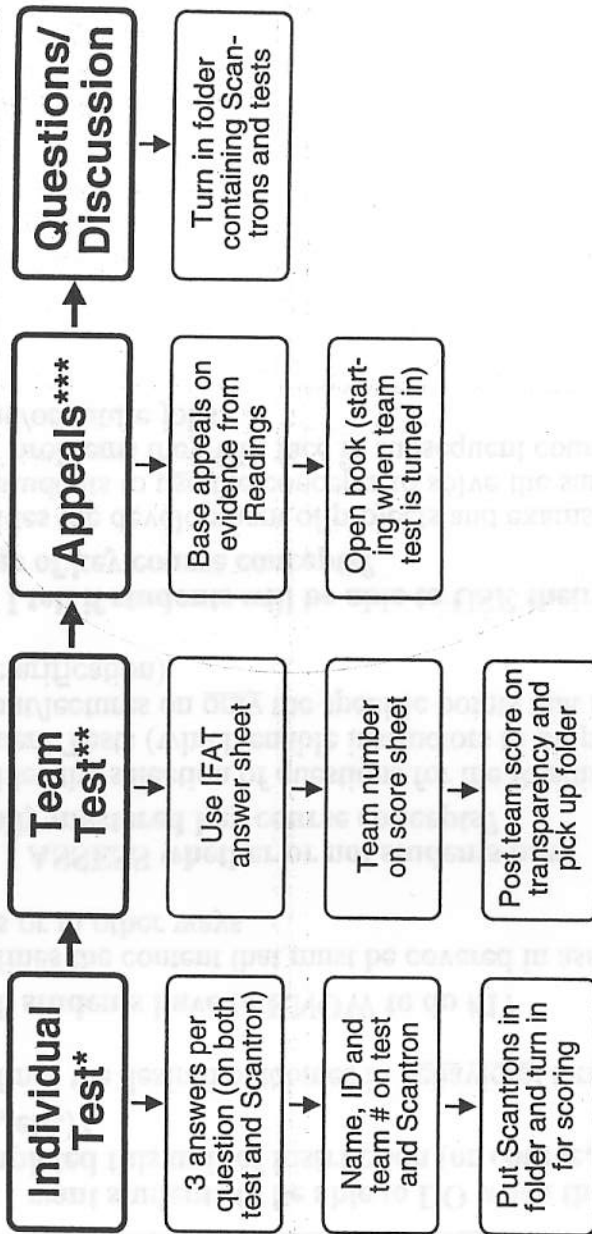


EXHIBIT D-A5  
Readiness Assessment Test Procedures

EXHIBIT D-A5  
Readiness Assessment Test Procedures



\* Teams can begin as soon as they turn in their Scantrons and pick up the team test.

\*\* A 5-minute warning will be given when one third of the teams finish the team test.

\*\*\* Teams can begin working on appeals as soon as their score has been posted.

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EXHIBIT D-A6  
Criteria for Effective Group Assignments

Prior to Group Discussions:

- Are group members required to use newly acquired concepts to make a specific choice, individually and in writing? (Note: This individual accountability is especially important in newly formed groups.)

During Discussions within Groups:

- Are groups required to share members' individual choices and agree (i.e., reach a group consensus) on a specific choice?
- Will the discussion focus on "Why?" (and/or "How?")
- Will the groups' choice(s) be represented in a form that enables immediate and direct comparisons with other groups?\*

During Discussions between Groups:

- Are group decisions reported simultaneously?\*
- Do group "reports" focus attention on the absolutely key issues?\*
- Are groups given the opportunity to digest and reflect on the entire set of "reports" before total class discussion begins?
- Will the discussion focus on "Why?" (and/or "How?")

The more "Yes" answers, the better. If the answer to all eight questions is "Yes", the assignment will effectively promote both learning and group development.

\* The form in which individual and group choices are represented largely determines the dynamics of the discussions that follow. Both individual reports to groups and group reports to the class should be as absolutely succinct as possible. One-word reports are the very best (e.g., yes/no, best/worst, up/down/no change, etc.) because they invariably stimulate a discussion of why one choice is better than another.

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EXHIBIT D-A7

Frequency of RATs and Application Exercises in a Specific Example  
Course: Organizational Behavior

Week(s)	Topic/Class Activity(ies)	Topic(s) Involved
1	Introduction; Form groups; Set grade "weights"	-
2	RAT #1 ("Effectiveness"); Application Activity	1
3	RAT #2 ("Org. Design"); Application Activity	2
4	Application Exam; Instructor & group/peer feedback	2
5-6	RAT #3 ("Motivation"); Application activities (2)	3
6	RAT #4 ("Communication/Decision Making");	4
7-8	Application Activities (3)	4
9	Integrative Application Exam (e.g., "Star Trek")	1-4
10	RAT #5 ("Groups"); Application Activity	5
11	RAT #6 ("Org. Climate/Development");	6
11	Application Activities (2)	6
12-13	Integrative Project & Oral (e.g., <i>Final Diagnosis</i> )	1-6
14	Application Activity (Course Review)	1-6
15	Preparation for Final	1-6
16	Application Final (e.g., "The Sting")	1-6

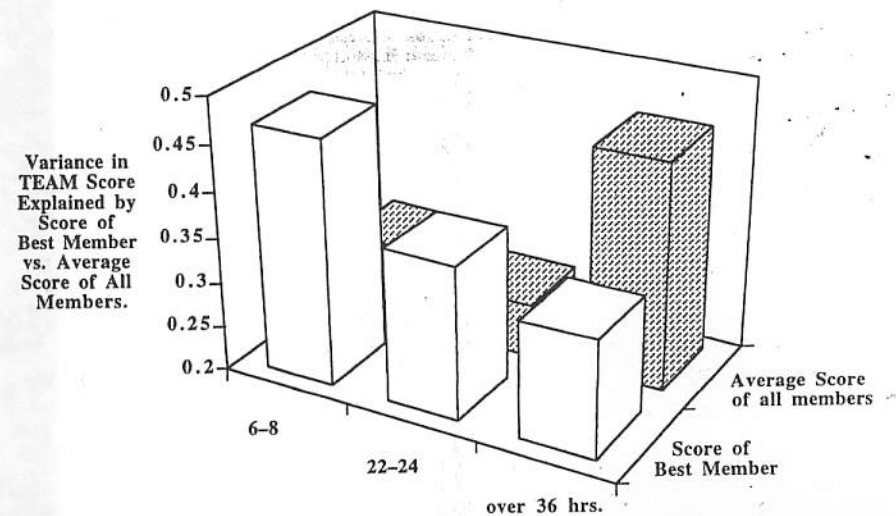
**Totals:**

- 6 Readiness Assessment Tests—early in the course
- 12 Topic-Specific Application Activities & Exams
- 4 Integrative Application Activities & Exams

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EXHIBIT D-A8.1

Impact of Time Working in Groups on Effectiveness of Using Members' Knowledge



**Comments:**

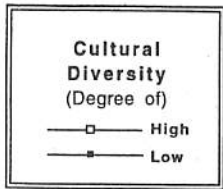
- 1 This illustration indicates that, as groups spend more time working together, their group performance scores correlate less and less with the score of their best group member, and more and more with the average score of all members of the group. This reflects the growing tendency of the groups to discuss issues fully and reach consensus on the best answer, rather than simply going with the answer of the perceived smartest member.
2. The time that it takes for groups to mature to the point that they have truly effective decision-making processes can be considerably shortened IF:
  - The groups are given really effective assignments and clear and immediate performance feedback, and
  - The teacher uses a "split-answer" format for Readiness Assessment Test questions to increase student awareness of the benefit of deliberating fully before deciding on a group answer.

Source: Watson, W. E., Michaelsen, L. K., & Sharp, W. Member Competence, Group Interaction and Group Decision-Making: A Longitudinal Study. *Journal of Applied Psychology*, 1991, 76(6), 801-809.

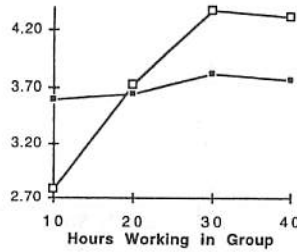
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EXHIBIT D-A8.2

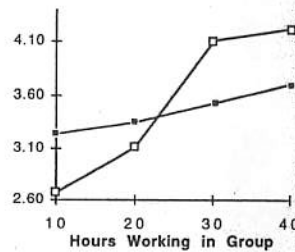
Impact of Cultural Diversity on Group Process and Group Performance over Time



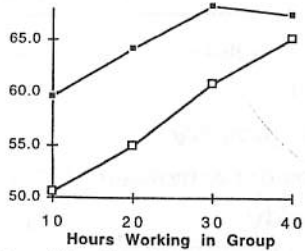
Range of Perspectives



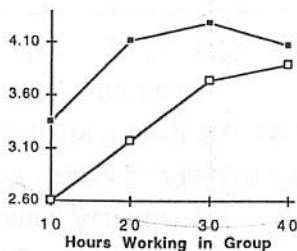
Alternatives Generated



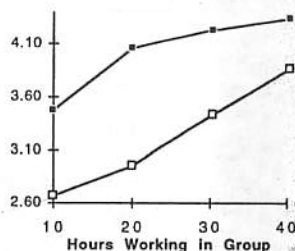
Group Process Effectiveness



Accurate Problem Identification



Quality of Solutions



Source: Watson, Kumar, & Michaelsen. *Academy of Management Journal*, 1993, 36(3), 590-602.

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EXHIBIT D-A8.3

Readiness Assessment Test Scores

(Cumulative scores after 4 RATs)

Team #	Individual Member Scores:			Team Score	Team Gain over BEST Member
	Low	Average	High		
1	142	169	188	204	16
2	126	154	168	201	33
3	135	164	183	210	27
4	149	165	184	197	13
5	149	173	192	213	21
6	107	166	187	207	20
7	135	162	181	213	32
8	140	163	186	203	17
Average	135.4	164.5	183.6	206.0	22.4

12% higher than the BEST team member



Note: This column containing students' names should be folded under when mounted on folders.

## Team # Performance & Attendance Record

Name	ID#	Readiness Assessment Tests/Totals*						Absences**			
		1	2	3	4	5	6	Date	Known	???	Total
								1/18			
	cum->							1/20			
								1/23			
	cum->							1/25			
								1/30			
	cum->							2/1			
								2/6			
	cum->							2/8			
								2/13			
	cum->							2/15			
								2/20			
	cum->							2/22			
								2/27			
	cum->							3/1			
								3/6			
	Group RATs							3/8			
	cum->										
	Structure Test	* Please record the number correct as soon as you have the results on each test and the <u>cumulative</u> scores below the dotted line. (Please use a pencil so that we can change your scores when we grant appeals.)									
	Star Trek	** Please record the number of absences for your group each time the class meets. (Note: it is always helpful to the group to know when a member is unable to attend class. If you have a problem and can't reach someone in your group, call the management office - 325-2651 - and we will pass the word on to your group.									
	Serpico										

Notes: 1) The names should be folded under when the chart is attached to the team folders.  
 2) We use the last 4 digits of student's ID numbers and/or have them provide an ID number we can use.

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### Purposes of the appeals process:

1. Clarify uncertainty about your understanding of the concepts.
2. Give additional recognition and credit when "missing" a question was caused by:
  - Ambiguity in the reading material.
  - Disagreement between the reading material and our choice of the "correct" answer.
  - Ambiguity in the wording of the question.

### Guidelines for preparing successful appeals:

Appeals are granted when they demonstrate that you understood the concept(s) but missed the question anyway or that your confusion was due to ambiguity in the reading material. As a result:

- If the appeal is based on ambiguity in the question, you should:
  1. Identify the source of ambiguity in the question and,
  2. Offer an alternative wording that would have helped you to avoid the problem.
- If the appeal is based on either inadequacies in the reading material or disagreement with our answer, you should:
  1. State the reason(s) for disagreeing with our answer and,
  2. Provide specific references from the reading material to support your point of view.

### Impact of appeals on test scores:

When an appeal is accepted on a question that a group has missed (no individual appeals will be accepted):

1. It "counts" i.e., the points missed will be added to:
  - their group score.
  - the score of any individual in the group who answered the same way the group did.
  - only those groups that appeal.
2. Group member(s) who had the original correct answer will continue to receive credit on the question.

**EXHIBIT D-B2.1**

**Peer Evaluation Form (Michaelsen)**

**Peer Evaluation** Name \_\_\_\_\_ Team # \_\_\_\_\_

Please assign scores that reflect how you really feel about the extent to which the other members of your team contributed to your learning and/or your team's performance. This will be your only opportunity to reward the members of your team who worked hard on your behalf. (Note: If you give everyone pretty much the same score you will be hurting those who did the most and helping those who did the least.)

**Instructions:** In the space below please rate each of the other members of your team. Each member's peer evaluation score will be the average of the points they receive from the other members of the team. To complete the evaluation you should: 1) List the name of each member of your team in the alphabetical order of their last names and, 2) assign an average of ten points to the other members of your team (Thus, for example, you should assign a total of 50 points in a six-member team; 60 points in a seven-member team; etc.) and, 3) differentiate some in your ratings; for example, you must give at least one score of 11 or higher (maximum = 15) and one score of 9 or lower.

Team Members	Scores	Team Members	Scores
1) _____	_____	5) _____	_____
2) _____	_____	6) _____	_____
3) _____	_____	7) _____	_____
4) _____	_____	8) _____	_____

**Additional Feedback:** In the space below would you also briefly describe your reasons for your highest and lowest ratings. These comments -- but not information about who provided them -- will be used to provide feedback to students who would like to receive it.

Reason(s) for your highest rating(s). (Use back if necessary.)

Reason(s) for your lowest rating(s). (Use back if necessary.)

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**EXHIBIT D-B2.2**

**Assessment of Contributions of Group Members (Fink)**

At the end of the semester, it is necessary for all members of this class to assess the contributions that each member of the group made to the work of the group. This contribution should presumably reflect your judgment of such things as:

- Preparation – Were they prepared when they came to class?
- Contribution – Did they contribute productively to group discussion and work?
- Respect for others' ideas – Did they encourage others to contribute their ideas?
- Flexibility – Were they flexible when disagreements occurred?

It is important that you raise the evaluation of people who truly worked hard for the good of the group and lower the evaluation of those you perceived not to be working as hard on group tasks. Those who contributed should receive the full worth of the group's grades; those who did not contribute fully should only receive partial credit. Your assessment will be used mathematically to determine the proportion of the group's points that each member receives.

Evaluate the contributions of each person in your group except yourself, by distributing 100 points among them. Include comments for each person.

Group #: \_\_\_\_\_ Points Awarded: \_\_\_\_\_

1. Name: \_\_\_\_\_  
Reasons for your evaluation: \_\_\_\_\_

2. Name: \_\_\_\_\_  
Reasons for your evaluation: \_\_\_\_\_

3. Name: \_\_\_\_\_  
Reasons for your evaluation: \_\_\_\_\_

4. Name: \_\_\_\_\_  
Reasons for your evaluation: \_\_\_\_\_

5. Name: \_\_\_\_\_  
Reasons for your evaluation: \_\_\_\_\_

Your Name: \_\_\_\_\_ TOTAL: 100 Points