Course Introduction

Welcome to your *Friendly Chemistry* course! We're very glad you've chosen to use *Friendly Chemistry* to help your students or children learn basic chemistry. Traditionally, chemistry courses are thought to be "hard" and intimidating. We think you'll find that learning chemistry with this guide to be just the opposite! Our goal in this course is to provide a means of building a solid foundation of knowledge about chemistry. Should your students or children choose to continue their study, you can be confident knowing they have the "basics" to meet the challenges of an advanced chemistry course.

Let's begin with an overview of the course. The course is divided into 32 lessons. Within each lesson there is a section of text followed by group activities, laboratory experiences and worksheet-type practice pages. These pages are found in both the students' work book and in your teacher's guide. In addition to these components, you will find in your teacher's guide, supplemental notes to help you prepare and carry out the lesson activities. These supplemental note pages include tips on how to present the concepts being introduced in the lesson, how to set-up and play the games used for practice of the new concepts as well as what equipment is necessary for the lab activity. In

addition, you will find a lesson test that you may choose to use to assess your students' understanding of the lesson. The solutions for the practice pages and tests are found in Appendix A of this edition. Note, also, that a comprehensive list of all supplies and necessary equipment can be found in Appendix B. Following Lesson 32, you will find a final course exam. The answers for this final exam are included in Appendix A.

Note that your students will have copies of each worksheet or lab activity page in their own workbook. There is no need to make additional copies for them.* The lesson tests and final exam are test masters and **only** found in the teacher's edition.

A set of teaching manipulatives accompanies each *Friendly Chemistry* student edition. These learning tools are extremely effective when used and can make teaching the course and learning chemistry tons of fun. They have been designed to assist your students practice the presented concepts in a multi-sensory way. They include the Doo-wop Board, several flashcard sets and a bag of playing pieces. Specific instructions for their use are found in the teaching notes for each lesson.

Finally, unlike traditional chemistry curriculum, we *encourage* you to email us if you have questions or concerns as you move through the course. We are more than happy to assist you when necessary to make this an enjoyable and meaningful experience for you and your students. Our current email address is hideaway1@gpcom.net. If you are uneasy or have questions about presenting any portion of the course, please send us a message and within 24 hours, we will respond to assist you! We are always looking for ways to improve the course—if you have ideas or helpful hints, please share those with us.

*Please note that our copyright policy strictly prohibits making photocopies by any means of any portions of the student book or teacher's guide other than photocopies of the test masters. Please email or call if you have questions regarding our copyright policy.

Tips on Getting Started with your Class

Game Plan (we always start with a plan of what should accomplished for each meeting/ week in the course.)

A. Introductions, course logistics and classroom rules

B. Play "I Have Never" game

C. Begin thinking about what a scientist does

D. Conduct Lab Activity: Observations of "Unknowns"

E. Play "The Communication Game"

F. Assign Black Boxes

A. Introductions, course logistics and classroom rules

Begin class by introducing yourself and others who may be leading your group. If necessary, tell some of your background and how you would like to be addressed. If your students are not acquainted with each other, have them introduce themselves. Continue by sharing the course logistics such as beginning and ending times of class, meeting dates and what each student should bring along to class. Do not neglect to inform your students what you expect in their behavior. Clearly informing them of your expectations is certainly more effective and ultimately more efficient than having to deal with unacceptable behavior and consequences later.

Make sure that all of your students know the location of the bathroom facilities and discuss your expectations of when and how students might be excused from class. If you have planned a break time, make sure your students are aware of what they might do during break time and the limits of where they might go if they leave the classroom..

After introductions, your students will likely be ready to get up and do some moving about! A really fun game that allows your class members to get to know each other better is **"I Have Never."**

B. Play "I Have Never" game

To prepare the room for play, move tables and desks aside and make a circle of chairs. Use one less chair than there are students playing. (I strongly suggest that you play, also! This gives your students the opportunity to see that you also like to play and have fun! If you play, use enough chairs for each of your students while you stand in the center of the circle.)

Begin play by standing in the center of your circle of seated students and stating something you have (honestly) never done before. Examples might include: "I have never been to Los Angeles" or "I have never eaten asparagus" or "I have never traveled in a train." Players who *have* done what you stated must get up and change chairs with another student while you also try to sit down. The object of the game is to *not* be left standing. The person who *is* left standing continues by stating something he or she has never done and play continues. If a player finds him or herself having to move, he or she cannot return to where he or she was previously sitting (for that round). Be aware that play can become rambunctious and sturdy chairs are highly recommended. Play can end when you feel your students have become better acquainted or you feel break time would be appropriate.

C. Begin thinking about what a scientist does

Continue your first meeting by brainstorming what a scientist does and might look like. Ask questions like: "Where do you find scientists?" "What kind of clothes do they wear?" or "What kinds of things do scientists do?" Write down your students' ideas on your chalk board or flip chart. When their ideas are exhausted continue with this next activity to reveal to your students that **they** are scientists as they continually observe and attempt to guess what, how, when, where and why things occur in their surroundings.

D. Lab Activity: Observations of "Unknowns"

Materials needed: Opaque sack (dark colored, cloth pillow case works well)

Various objects that can easily fit and be safely felt of inside the sack.

Examples include: small toys, balls of various sizes, light bulb, pen or pencil, etc.

Begin the activity by telling your students that you have possibly placed an object inside the sack. Tell them that you would like them to feel inside the sack, make as many accurate observations as possible (without looking inside) and then pass the sack to the next student. Ask them to not make any verbal observations until all students have had the opportunity to feel inside the sack. You may ask them to record what they observed.

Once all have made their observations, ask your students to describe their observations (not *what the object is* but, rather, words that describe the object). These might include the texture (smooth, rough, hard or soft), approximate size, shape, temperature, or any peculiar parts of the object that students remember. Once all observations are shared, ask for educated guesses (hypotheses) as to the identity of the object. Accept all guesses - resist any temptation or attempt by other students to squelch an idea of another student. Finally, reveal the object and discuss the observations, hypotheses and final conclusions made by the students. Emphasize how observations are made using our senses (primarily touch and, possibly, hearing and smelling in this activity!). Repeat the activity using the various objects you collected.

At first exposure, this activity might appear to be rather elementary and useful for very young students. However, we have used it to hone observational skills in the older students as well. Consider these variations: use two bags and within each place one regular incandescent light bulb. Pass around both sacks (start one sack on one side of the room and the other on the opposite). When all students have felt inside both bags, ask the following types of questions: "Tell me some observations of the object in bag A and then bag B: Are the objects the same size? Which is larger/smaller? How do you know that? Do they have any sort of writing or printing on them? Can you tell me the wattage of each object? How did you know that? Can you tell which bulb is still useable? How did you know that?" As you can see, to answer these questions takes keen observational skills. I always encourage students to make additional observations. Other objects which can be used to challenge older students include toys which have apparent defects such as missing wheels on toy cars or legs on toy animals or dolls. You will find that observational skills increase markedly the longer you play.

A variation on this activity that always brings a lot of laughs is, instead of using one's hands to observe an unknown object, use one's feet to make observations. If your sack holding the unknown object will not be large enough to accomodate an inquiring set of toes, use a cardboard box with a hole cut into one side to allow access. Your students may be quite surprised to find that their feet, like their hands, can make very accurate observations!

To emphasize that we also make observations using our sense of smell, collect a set of smelly items which might include (but is certainly not limited to) spices (such as cinnamon or pepper), fruits, perfumes, toothpaste, cheeses, pickles, an empty used pizza box, etc. Place these objects one at a time into a concealed box or bag and then allow each student to take a whiff of each. Again, allow all students to make and possibly record observations before any verbal comments are made. Probe for reasons why various hypotheses are made. Interesting items to try include coffee beans or banana peels about which you might ask your students if they would eat the object if offered to them. Seeing a darkened banana peel makes the point very clear that making a multitude of observations using a variety of senses (especially sight and taste, in this case) often results in the most accurate hypothesis.

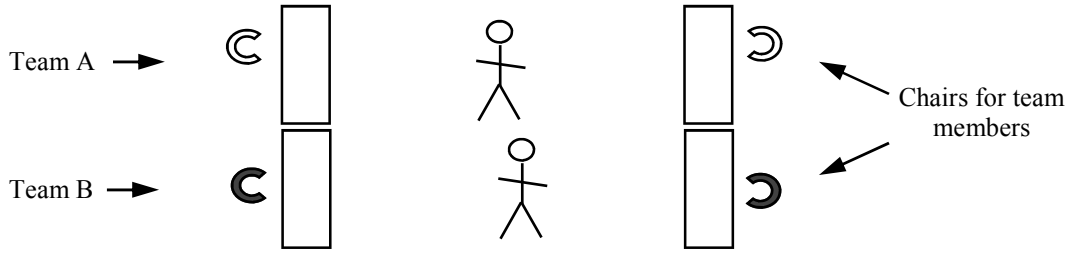
To exercise your students' senses of hearing, consider preparing a recording of common sounds around the house or yard. Play this recording for your students and allow them to write down what they feel the sounds may be. If time permits, you can allow your students to make their own recordings and then play them for the rest of the class.

To end this set of activities, review the concept that we use our senses to make observations and then, based upon those observations, we make educated guesses (hypotheses - I like to call them "smart guesses") as to what we have observed. We then share that information with others. At this point, emphasize the concept that this is exactly what a scientist does! Scientists continuously make systematic observations, build hypotheses based upon those observations, test those hypotheses and then share that information with others! Let your students know that they are already true scientists and that learning science can be exciting and certainly lots of fun.

E. Play The Communication Game

To finish the first meeting, we like to end with a game that combines all aspects of what was discussed during the first class period. We call it **The Communication Game.** For this game you will need at least two tables and enough chairs for all but two players. This game works best with at least six players (you will have to serve as a referee for this game!). Divide your students into at least two teams with at least three players on each team. The more teams the better, but more than 8 teams can be a little too much to handle!

Place the tables parallel at each end of your playing area with enough chairs behind each for all but one player from each team. See the diagram below.



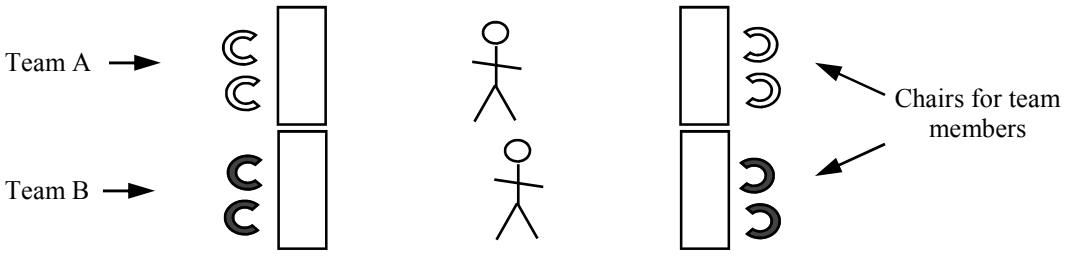
In this diagram you can see that there are two teams playing (A and B) and that one member from each team sits at each table directly across from his or her teammate with one teammate standing in the space in between the tables.

Materials you will need for this game include: a set of Duplos or Legos with enough pieces to allow you to create 2 sets of identical blocks for each team. For example, you might need enough blocks to have one large red block, one large blue block, one large green block and one small yellow block to make two sets for each team. In the diagram above, all members seated at a table will have a set of these blocks. It does not matter what the composition of these sets of blocks is as long as each team has the same set as the rest of the teams have.

In addition to the sets of blocks, each sitting team member will need something in which to hide his or her set of blocks from view. Suitable items include a folded newspaper, file folder or small upturned box.

To review, each seated team member in the above diagram has one set of blocks identical to all other seated team members and some sort of device to hide it from view.

[Important Note: If your teams are composed of more than three players each, these additional players will be seated aside fellow team members at each table. Only one player is needed in between the tables. Each team will only need two sets of blocks (one set at each table). The diagram below shows how you will arrange the playing area for two teams, each with five players.]



The sets of team members that are seated at the tables on the left side of the diagrams are named **observers**. The team members seated at the tables on the right side of the diagram are named the **builders**. The team members standing in between the tables are named the **messengers**.

Before play begins, assemble the blocks in a particular arrangement and share this arrangment with each of the **observer** team players. Keep the arrangement hidden from view of both the messengers and the builders. All observers should place their assembled blocks within their newspaper or box out of view of the mesengers and builders. The builders should also place their blocks (not yet assembled) inside their newspaper or box.

At the signal of "go," the observers will describe the arrangement of blocks to their respective messenger who, in turn, will relay this information to the builders. The builders will then attempt to build the exact model that the observers are describing. However, at no time can the messenger see any of the blocks (the observers' nor the builders' blocks). The messenger can receive and deliver information as many times as necessary in order for the builders to complete the model. When the builders feel they have completed the model, they tell the messenger to call "time-out." You (being the referee) call "time-out" which signals to all players that play must immediately stop and no more communication can take place. You then check the proposed model of the builders, comparing it against that of the observers. Be careful not to allow any

messenger or observer to see what has been built. If the model is identical to that of the observers, that team wins the round. If the model is *not* identical, play continues when you say "go!" Play continues until another messenger calls "time" which gives you the opportunity to check the proposed model for accuracy. Should any team members choose to not stop communicating when "time" has been called, you may wish to impose a penalty by holding the messenger (not allowing any communication to take place) for five seconds on the subsequent round of play. Once a team successfully builds the model, that round officially ends and a new model needs to be built for the observers. Play 4-5 rounds with the students in their original locations and then rotate them to a new location on their team. Play until everyone has an opportunity to experience each team position.

If time permits, try these variations: allow the observers **no** use of their hands to communicate what they see to their messengers; allow the observers to use **only** their hands to communicate what they see to the messengers (no voice); allow the observers no use their hands nor their voices to communicate to the messengers.

Although this game may seem complicated to set up and get started, we have found that children (and even adults!) truly enjoy the challenge of playing it. After play, ask the students how they felt when communication was not taking place among their team members. How did they improve communication? Did having more team members necessarily improve the ability of the team to succeed at communicating?

F. Assignment: Black Boxes

Should you choose to give an assignment to your students, consider making "black boxes" for your students to take home with them. To make a black box, fill an opaque container with a variety of small objects - usually 2-5 objects such as marbles, paper clips, thimbles, etc. Completely close the container and tape it shut. Empty yogurt cups with lids or washed milk cartons work well as containers.

The assignment for the students is to answer three questions: 1) how many objects, if any, are inside the black box; 2) of what could these objects be made; and 3) what is the identity of these objects. The students can perform whatever tests they feel necessary to answer the questions **except** opening the box and directly viewing the

objects. Ask them to write a short report of their findings along with evidence to support their hypotheses. Allow them to share their findings with the rest of the class at the next class meeting. After all have presented their findings, allow the students to open their containers. As an extension, have the students create a black box for another classmate to take home for the subsequent class meeting.

When class time comes to an end, review each activity of the day. Make a concerted effort to emphasize that although many of the activities resembled play, the students were indeed practicing skills that scientists use on a daily basis: observing, hypothesizing and finally, communicating. Hopefully, your students will leave knowing that learning science (and especially chemistry) can be lots of fun, also!