4-H Aquatic Science

Leader's Guide

4-H Aquatic Science

Studying and learning about fish is fun for everyone. The Indiana *4-H Aquatic Science* manual was written for youth who want to learn about fish. The key to learning with any 4-H project is for youth to enjoy their studies and to learn at their own pace. We hope this study is just the start of a lifetime enjoyment of aquarium fish. Youth can enhance their learning experience by using other resources from the Internet, school, or a local library.

Parents can be a big help if they are involved with their child's learning, especially for younger 4-H members. Parents that sit in on meetings and ask their child about what they learned and what they did not understand help their child have a stronger learning experience. Youth are more excited to learn if they have parental support and interest in what they are doing. As they mature, youth should take on more responsibility for their learning and move to independent learning. Parental interest will reinforce what youth learn at any age.

General information about the Indiana natural resource projects, including *Frequently Asked Questions* and exhibit pictures from the Indiana State Fair are available at:
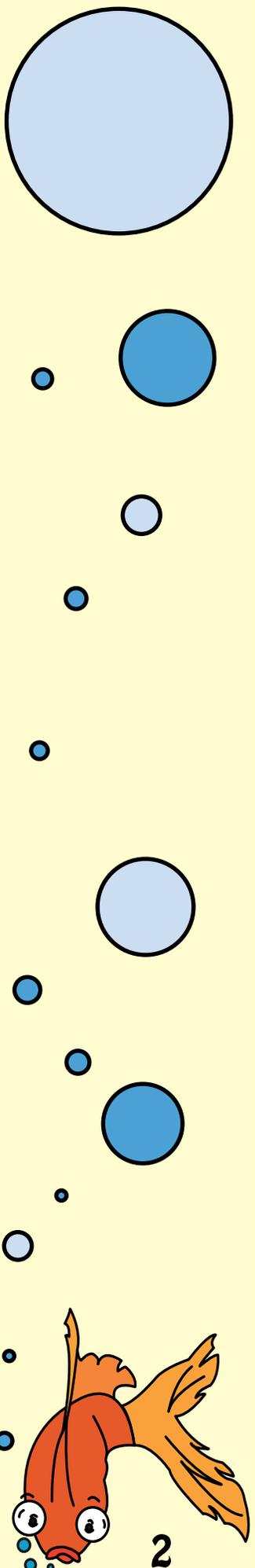www.four-h.purdue.edu/staff.home/natalie/4h.html

Exhibit guidelines and record sheets are available on-line at:
www.four-h.purdue.edu/projects.

Note: The Indiana 4-H Aquatic Science manual gives an introduction to raising fish in an aquarium. Goldfish are recommended for youth to start with because they are inexpensive and easy to care for. Youth that want to continue with this project will need to use additional resources, such as the 4-H curriculum from Ohio State University. Information on these and other resources are given on page 13 (Resources).

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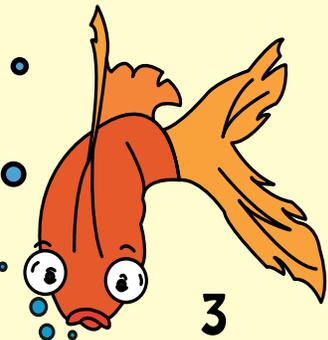## Learning Goals

4-H 447-W

Youth will:

- Begin to learn about keeping fish in an aquarium. Goldfish are recommended because they are easy for beginners to care for.
- Develop an understanding of, and an appreciation for, the responsibility of caring for fish.
- Exhibit information about aquarium fish to others in an engaging manner.

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The Experiential Learning Model

The Experiential Learning Model is a way of teaching to help youth make the most of any activity that they experience. Experiential learning distinguishes 4-H activities from many other educational methods. Experiential learning is a process that allows youth to first learn by doing, before being told or shown how, and then process the experience. Activities are designed so youth **experience** a learning activity, **share** what they did, **process** what they did (discuss, analyze, reflect), **generalize** what they learned (to test the 4-H member's comprehension and appreciation of the activity), and then think about how they can **apply** what they learned to other situations (generalize).

The advantages of using the experiential learning process in group settings include:

- The adult can quickly assess the student's knowledge of the subject.
- The student builds on past experience or knowledge.
- The adult acts as a coach rather than a teacher.
- The youth relate the experience to their own lives and experiences.
- Mentors may use a variety of methods to involve the youth in the experience.
- Youth with many different learning styles can be successful.
- Discussions can move from the concrete to the abstract and analytical, at the middle and high school ages.
- Youth are stimulated to learn through discovery and to draw meaning from the experience.
- Youth can work together, share information, provide explanations, and evaluate themselves and others.
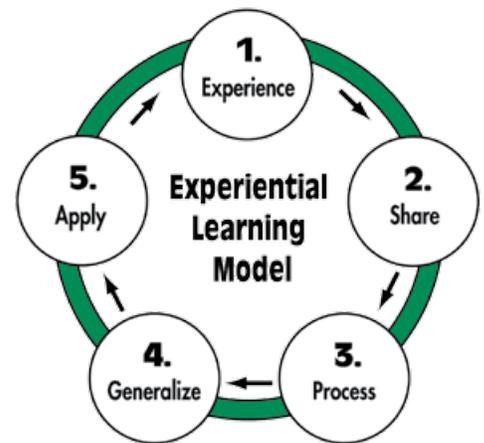
Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals" © 1983 John Wiley & Sons, Inc. Reprinted with permission of John Wiley & Sons, Inc.

Youth take responsibility for their own learning. Evaluating youth learning using a simple rubric (such as the one shown) can help 4-H volunteer leaders assess the effectiveness of their teaching methodology and youth interest. Evaluate each step of the experiential model by indicating what you think the 4-H members learned in a particular activity (your best guess). Work on improving any low scores.

Step	Excellent	Average	Minimal
Experience			
Share			
Process			
Generalize			
Apply			

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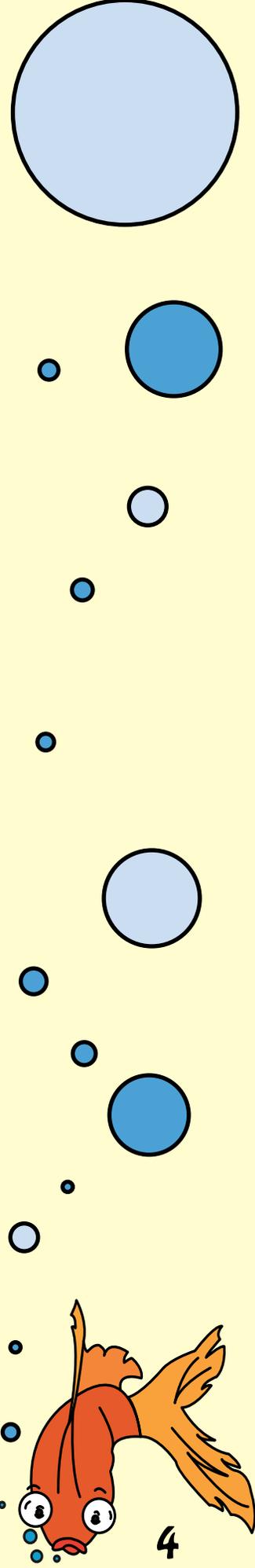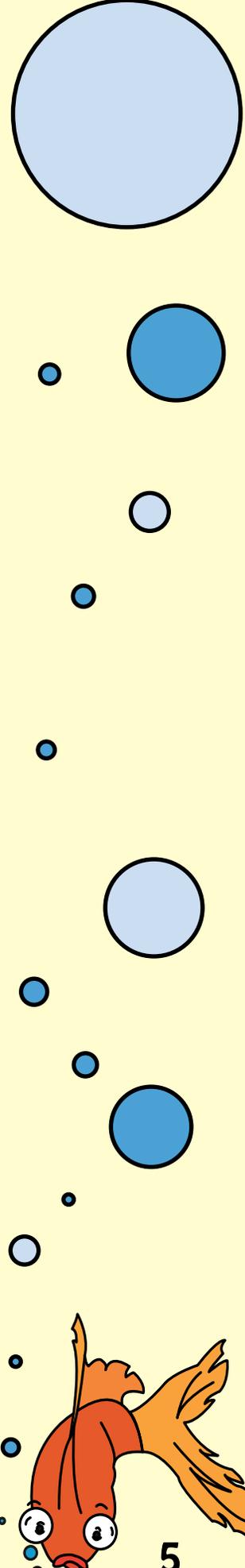
Youth Developement Stages

Understanding the physical, mental, social, and emotional development of youth will help you when working with the 4-H members in your club. No two youth develop at the same rate and transitions are often gradual. Your teaching and involvement helps4-H club members grow and mature and makes 4-H a rewarding and fulfilling experience.

Activities at 4-H club meetings are not always as successful as you, the volunteer leader, had planned. Sometimes youth talk among themselves rather than listening to you; sometimes no one comes to a planned field trip; or sometimes no one speaks up to answer your questions when you are trying to involve the youth in the discussion. If you are working with a broad age range, the activity may be too simple for the older youth and too difficult for the younger ones. This is very challenging for the 4-H leader. Giving the older 4-H members leadership opportunities can be very effective.

Youth of the same age can vary greatly in physical, mental, social, and emotional growth and interests. These differences are even more marked between age groups. Research has shown that there are some generalities that can help you understand how to plan activities for different age groups.

Early Elementary (Pre 4-H age)

This is a very active age, so it is important to keep children in their early elementary years busy. They are concrete thinkers and need to understand what you want them to do and how to do it. They are generally more interested in making something than in completing a project (process is more interesting than product). Youth in this age group tend to seek adult approval and depend upon adults, although the opinions of their peers are beginning to be important. They do best in small groups with set rules and rituals. Competition is inappropriate for this age group.

Upper Elementary

This is also a very physically active age, so hands-on activities work best. Youth in the upper elementary grades are still fairly concrete thinkers (things are black/white or right/wrong), but are beginning to think logically and symbolically. Because this age group has a strong need to feel accepted, it is best for an adult to evaluate each product, rather than hold competition among peers with only one winner. This age child prefers to know how much they have improved against past efforts and how to improve in the future.

These youth are beginning to identify with peers, but continue to value adult guidance. They are also beginning to discover the benefits of making other people happy, but more for the benefits to themselves rather than the benefit to others. They begin to take responsibility for their actions at this age and begin to develop an increased independence of thought, which may allow them to try new things. Letting this age group help in the decisions of the club helps them start to learn about leadership.
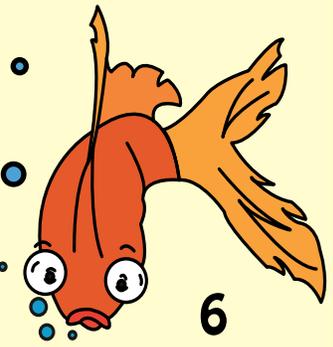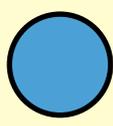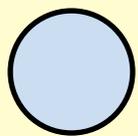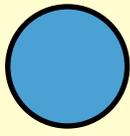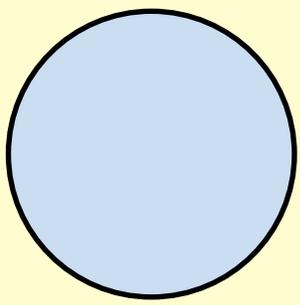
Middle School

Middle school youth are beginning to move to more abstract thinking. Justice and equality are important to this age. Therefore, project judging may now be viewed in terms of what is fair, as well as being regarded as a reflection of self-worth. Youth in their middle school years prefer to find their own solutions, rather than to be given solutions by adults. Try to provide supervision without interference. Independence of thoughts and actions begins to emerge. Avoid comparing middle school youth with each other – performance should be compared with past accomplishments.

Junior volunteer organizations often are popular with teens toward the end of this age group, particularly if there are opportunities for developing leadership and interacting you youth of the opposite sex.

High School

Most high school-aged teens know their abilities, interests, and talents. They tend to be very concerned with themselves and their peer group. While they can understand the feelings of others, they tend to be self-absorbed, particularly in the earlier years of high school. Relationship skills are usually fairly well developed. Getting a driver's license increases both independence and dating. Acceptance by members of the opposite sex is very important.

High school-aged youth begin to think about the future and make realistic plans. They enjoy career exploration and preparation. Their vocational goals influence the activities they select.

Projects requiring research and creativity give teens an opportunity to demonstrate how much they have learned and what they can accomplish. Teens set goals based on their personal needs and priorities – goals set by others are generally rejected.

As teens master abstract thinking, they may try new ideas in ways that confuse adults. Teens can generally initiate and complete tasks without supervision. A leader can help by arranging new experiences in areas of interest to teens but must be sure to allow them plenty of input. Assume the role of advisor/coach for independent workers, rather than teacher/lecturer. Club meetings, rituals, and uniforms do not generally appeal to this group. Many teens enjoy looking back on their achievements in 4-H, teaching younger 4-H members, and appreciate special recognition for leadership activities. By the time they graduate from high school and begin college or a career, youth feel they have reached the stage of full maturity and expect to be treated as such.

Some Final Thoughts

You, as the club volunteer, are a valuable asset to your community and to the members of your club. The guidelines for the stages of child and youth development – in combination with your special skills and interests in youth – will help you plan and carry out a successful 4-H program and make a positive impact on the lives of young people.

These guidelines only give a brief overview of child and youth development. They are intended as a resource to help you plan your activities as a volunteer leader. The publication, *Ages and Stages of Child and Youth Development,** has more in-depth information and is available from your county Extension Office.

* *Ages and Stages of Child and Youth Development, A Guide for 4-H Leaders*, NCR 292
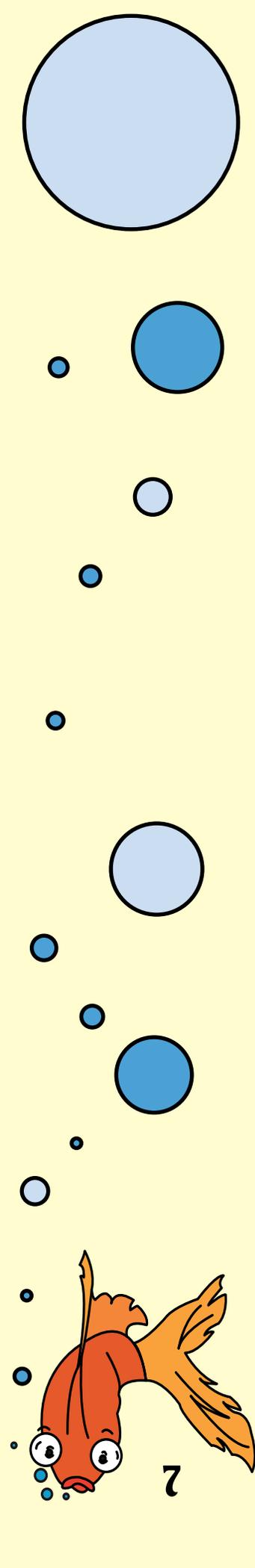
Aquatic Science, Indiana Youth Manual

The *Indiana 4-H Aquatic Science* manual is intended as an introduction to raising fish in an aquarium. Goldfish are recommended for youth to start with because they are inexpensive and easy to care for. Youth that want to continue with this project will need to use additional resources, such as the 4-H curriculum from Ohio State University. Information on these and other resources are given on page 13 (Resources).

There are no questions or activities, as are found in many 4-H manuals, in *Indiana 4-H Aquatic Science*. The manual focuses on getting started in raising aquarium fish. The following topics are briefly discussed:
- Types of fish recommended for beginners.
- Planning – what youth will need before they bring their fish home.
- Getting started – how to set up an aquarium.
- Locating the aquarium.
- How to fill the tank.
- Choosing the fish.
- Kinds of fish.
- Fish care.
- Equipment youth can make.
- Suggestions for exhibiting fish.
- Suggestions for advanced studies.
- Record sheets.

Youth are encouraged to keep record sheets. By keeping careful records they can keep track of expenditures, losses, breeding success, etc. The following record sheets are included in the manual and are available online (http://www.four-h.purdue.edu/projects/. Click on "Aquatic Science." Then choose "Record Sheets," which is on the left-hand column):
- Fish record – type, number, date acquired
- Equipment and supplies – item and costs
- Food and feeding practices –types and effects
- Losses – record of deceased fish and symptoms
- Breeding records – dates, breeding habits, protection for young
- Problems – notes about problems encountered
- Experiment record

Poster Exhibit Guidelines and Suggestions

Fair exhibits give youth the opportunity to show the public what they have learned in their project work. Indiana State Fair guidelines require the following:

- Exhibits must be displayed horizontally, sized 22" x 28", mounted on a firm backing (foam-core board or other), and covered in clear plastic or other transparent material.
- A display box (18" x 24"), orientated horizontally, may be used to make specimens more secure.
- Each exhibit must include a label with name, grade, and county.
- The exhibit title should indicate the level: Beekeeping 1, 2, or 3. The sub-title should explain the topic being exhibited.
- The Indiana State Fair exhibit guidelines are given on the Indiana 4-H Web site (www.four-h.purdue.edu, click on "Projects" in the menu bar right under wthe green "Indiana 4-H").

Exhibit Suggestions, adapted from suggestions developed by Roger Sherer, Extension Youth Educator in Wells County.

1. Poster board – use white when required. Youth can experiment with other colors when white is not required.
2. Mounting adhesives – the best is rubber cement since it leaves no marks and won't wrinkle paper. White glue should be used only in cases where wrinkling or damage will not occur.
3. Colored pencils – the best are soft-leaded – they are easy to color and blend easily – strokes will not show if handled properly. Soft-leaded pencils can be purchased at art stores. Hard-leaded pencils are less expensive, but are more difficult to use.
4. Labels – plain 3" x 5" file cards work well as they have a smooth finish and are sturdy enough for gluing and removing smudges.
5. Stiff backing – any material that will keep the poster from bending will work. Foam-core board works well, if you can find it in the correct size, because it can take the place of poster and backing. Examples of backing include: foam-core board, very stiff cardboard, plywood (which makes the poster heavy), and masonite (1/8" thick works well and can be re-used).
6. Acetate or other clear plastic covering – this is required for most posters to keep them clean before judging and if fairgoers touch them. Coverings generally come in various thickness (3, 5, 7 ½, and 10 mill) in rolls or sheets.
7. Plastic tape – not necessary but it makes attaching poster board to stiff backing easy. Tape is available in many colors and widths, and may be cloth or plastic. The 1 ½" wide tape can give the poster a border. Available at discount stores.
8. Lettering – type labels and title on a computer or typewriter or use stencils, self-adhesive, or press-type letters purchased at discount or art stores.
9. County ID labels – an identification label should be placed in the lower right hand corner of poster projects. Check your county guidelines for requirements.
10. Your poster should read like a dollar bill:
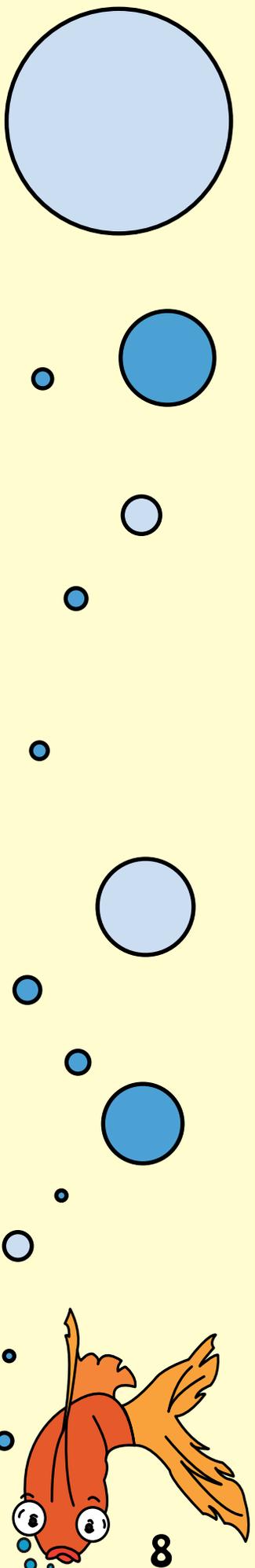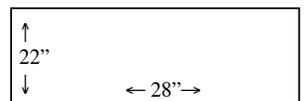
↑
22"
↓   ← 28"→

Exhibit suggestions, adapted from suggestions developed by Amy Nierman, Extension educator, Washington County, and Angela Apple (1998 Indiana State Leaders' Conference)

A Good Poster	Planning
• Attracts attention • Is simple and clear • Interests someone in some aspect of your project	• Know the project requirements. • Read the manual – look for ideas. • Brainstorm ideas and make a list. • Think of titles with alliteration (repeating a sound in words). • Look at other posters for ideas – but <u>don't copy.</u>

Tips - Do's

• Don't use too many words. The poster is not intended to show all that you know, but to teach some aspect of your project. • Use a combination of illustrations and words. • Be as neat as you can. • Cut evenly, cement carefully, blend colors when using crayons or colored pencils. • Leave white space on the poster. • Make sure the poster is balanced.	Choose colors carefully. General guidelines: • Black tends to be more formal, neat, rich, strong. • Blue is cool, melancholy, or depressed. • Purple is considered royal, rich, imperial. • Red stands for love as well as anger and hatred. • Orange is generally used for Halloween and is festive and gay. • Yellow tends to be warm, light, or ripe. • Green is fresh, young, or growing. • White means pure, clean, and neat.

Don't

• Make a vertical poster.
• Use Saran Wrap to cover.
• Use staples, tacks, or tape.
• Use fluorescent posters.
• Create a poster that is all words or a poster that is all pictures.
• Put too much information on the poster. Fairgoers rarely look at a poster for more than 10-20 seconds. If it catches their interest right away, they might read it for 1-2 minutes.

Steps to Making Your Poster

1. Read your project manual.
2. Read your county project requirements.
3. Decide on information to include on the poster.
4. Sketch out your idea.
5. Collect supplies.
6. Mark guidelines for lettering and pictures (lightly).
7. Layout letters, pictures, etc., on the poster.
8. Cement (glue, etc.).
9. Clean up the poster so it is neat. Erase any guidelines that are showing. Remove excess rubber cement or glue.
10. Glue poster to backing.
11. Cover poster with plastic.
12. Take your poster to the fair on the right day and at the right time.
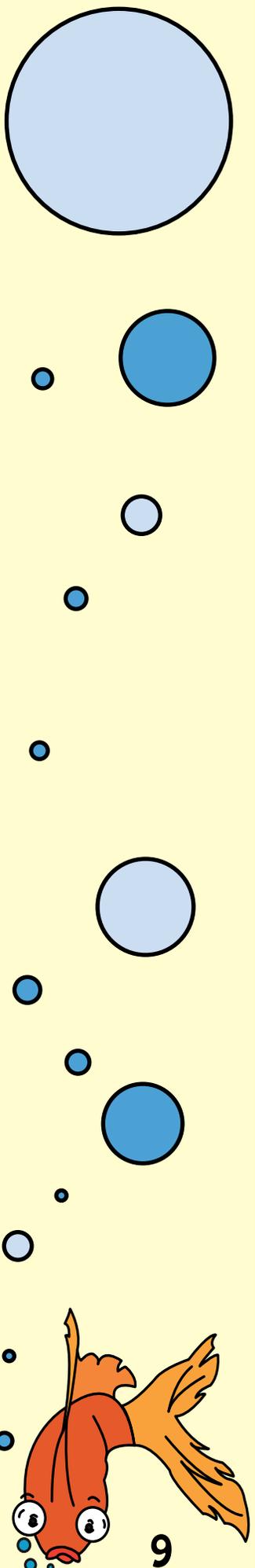
Poster Judging Suggestions for Judges

Reminder — The goal for all project work is to give guidance to youth as they learn about something they have a particular interest in. The goal of a poster is for the 4-H member to share information that they have learned by doing their project work. The poster is not intended to show all that the 4-H member knows, but to teach some aspect of their project. Posters should be eye-catching and attractive. Fairgoers rarely will look at a poster for more than 10–20 seconds, unless it catches their interest right away. Then, they might read it for a minute or two.

Age-appropriate judging is critical so that each youth is treated fairly. Young 4-H members (grades 3–5) should not be expected to have the fine motor coordination or advanced thinking skills of an older 4-H member. Older youth should begin to take the concepts they have learned and apply them to a particular situation. Originality is expected of high school youth.

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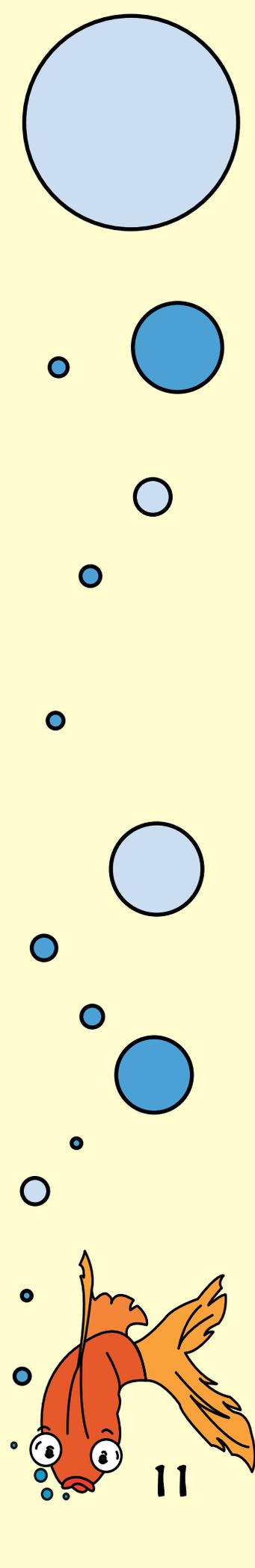
Action Demonstrations

What is an action demonstration (action demo)?

An action demo is a fun way to share what you have learned in your 4-H project with others. It's a kind of "Show and Tell" but with more action. Action means that you need to get the audience involved in what you are doing, not just show them. An action demo is not like a regular demonstration where the audience sits and listens to a prepared talk. An action demo gets the audience involved. Action demos can be given anywhere there are a lot of people, such as a county or state fair, shopping mall, street fair, or any 4-H event. Your job as a demonstrator is to interest the audience in your topic so that they stop and learn something new or try their hand at what you are doing.

How do I choose a topic for my action demo?

Your action demo should be related to this project. Consider the following questions when choosing a topic:

- Can you complete the action demonstration in 3 to 5 minutes?
- Is your action demo showing something that would interest the general public?
- Is there a good way to involve your audience in your action demo ("hands-on" or answering questions)?
- If you will be doing it multiple times: Can the supplies for the "hands-on" section be used over and over again, or will they need to be replaced? (Remember – if the materials must be replaced, it will cost more to do the demonstration.)

How can I get the audience involved?

The first thing you need to do is be enthusiastic and attract people's attention as they walk by your table. You might have a colorful tablecloth or poster to spark their interest. You might ask them a question, "Can you tell what mineral this is?" or "How old do you think this fossil is?" Many people enjoy hands-on activities, so once you get a few people at your table, they will attract others. Some ideas for getting your audience involved include:

- Show how you would identify a fossil or mineral.
- Use your audience to make a geologic timeline.
- Judge the quality of various items.
- Play a game.
- Answer questions.

How long does my action demo have to be?

Your action demo may vary in length. But the demonstration itself should last only 3-5 minutes, because most people do not like to stop to watch very long presentations. If you do your Action Demo at the Indiana State Fair, be prepared to repeat your action demo over and over again with different people during your assigned time.
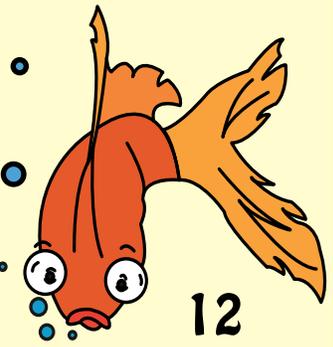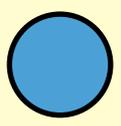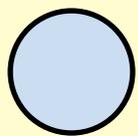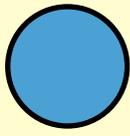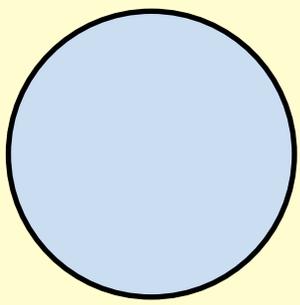
Action Demo Checklist

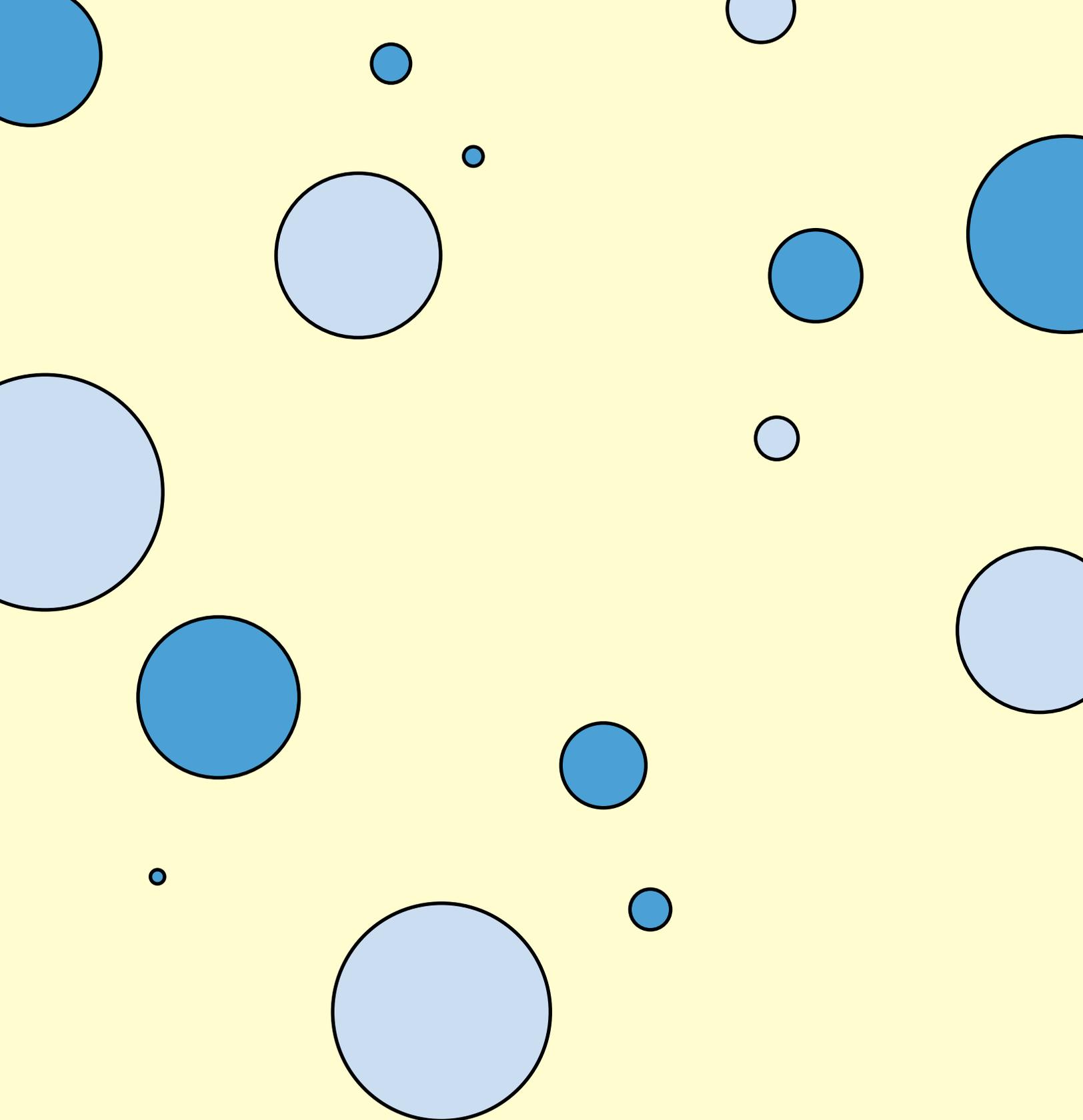| Topic	Yes	No
Was the topic interesting to the general public, causing them to stop, watch, or participate?		
Did the topic stimulate questions from the audience?		
Was the topic of suitable length?		
Did the topic include something "hands-on" for the audience to do?		
Organizing the Content	**Yes**	**No**
Was the topic organized into short "show and tell" segments, which were done repeatedly?		
Were segments presented in logical order?		
Were segments explained so that the audience understands "why?"		
Was it evident that the 4-H member was knowledgeable about their subject and could answer questions?		
Did visuals, pictures, posters, or actual objects clarify the important ideas?		
Presenting the Demonstration	**Yes**	**No**
Did the 4-H member seem enthusiastic?		
Did the 4-H member encourage the audience to become involved in the demonstration?		
Did the 4-H member speak directly to the audience?		
Did the 4-H member show evidence of practice and experience?		
Did the 4-H member show that she/he enjoys talking to the audience?		
Did the 4-H member show friendliness and a business-like manner?		
Did the 4-H member tell about what they learned through this 4-H project?		
Comments:		

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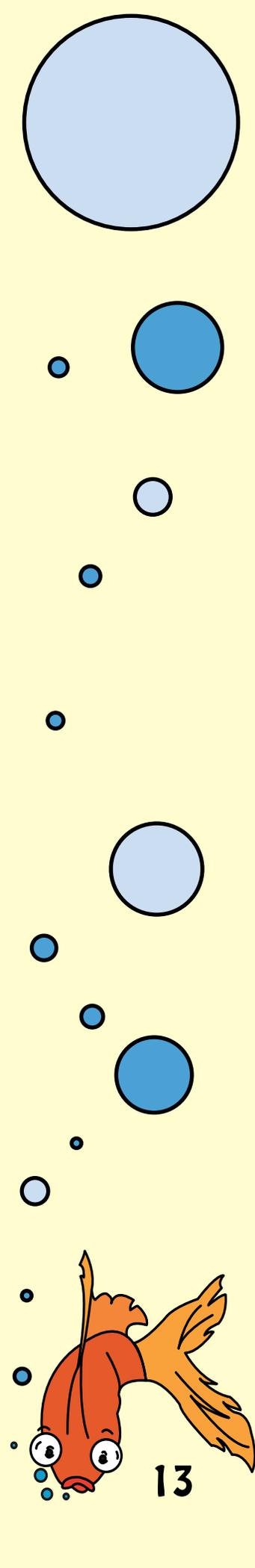
Resources

An excellent 4-H Aquatic Science curriculum is available from The Ohio State University. You can order it online at http://ohioline.osu.edu/~buckpubs/. This site gives publications listings by categories. Scroll down to 4-H and look for the following publications under the Aquariums section. (You can access the OSU 4-H catalog directly at http://ohioline.osu.edu/4-H/fguide00/.)

- **625GPM Fishy Science** (Note: GPM=Group Project Manual)
  Explore the unique features and abilities of fish in four easy-to-use lessons. Includes activities on how fish breathe, float, drink, and swim. Recommended for project advisors and third- through fifth-grade teachers.
- **626 Keeping Fish Alive**
  Know more about a healthy environment by designing a functional aquarium for your fish. You need a 10-gallon aquarium for this project.
- **627 Special Aquarium Setups**
  Plan and study how to raise four types of fish in an artificial environment that will keep them alive. You need a 20-gallon aquarium for this project.
- **628 Aquatic Plants**
  Design a natural environment by growing plants in an aquarium to keep your fish healthy in the tank.

Another useful publication is *Exploration Activities in Aquaculture* from Interstate Publishers Inc., Danville, IL (800) 843-4774 or e-mail info-ipp@IPPINC.com, ISBN 0-8134-3105-0 ($14.95 for 4-H clubs, as of July 2001).

Additional information for advanced study is available from many sources. Your local library, bookstore, hobby store, or the Internet will offer a wealth of information on raising fish.