

Ladder Ball

Name: _____

Date: _____

Description:

We are going to make Ladder Ball games. The construction of this project will focus on skills and techniques that are used in irrigation assembly. You will be working with PVC pipe, fittings, glue, and cutting tools. Measuring, cutting, gluing, painting, and fitting will be covered in this project. A high level of detail and focus will be required to be successful at creating good looking and functional products.

Materials:

36' of 3/4" Sch. 40 PVC
8 - 3/4" SS elbows
12 - 3/4" SSS Tees
4 - 3/4" caps
blue, red, yellow spray paint
PVC glue (clear)
(6) solid core golf balls
10' - 1/8" nylon cord (parachute cord)
fine grit sandpaper

Tools:

Tape Measure
Pencil
PVC Pipe Cutter
Hacksaw
Drill Press / 1/4" Bit
Vise
Sharp NM Cable Cutter
Propane Torch

Directions:

Before you Start! Put on your safety glasses. Read all directions and study the plans

Gather it

1. Each student or team will need...
 - a. 35' of PVC pipe get
 - b. 8 - elbows
 - c. 12 - tees
 - d. 4- caps
 - e. 6 golf balls
 - f. 1/8" cord

Measure It

2. Cut your PCV pipe to the proper dimensions. Each person (one stand) will need to cut pieces for one complete ladder ball stand. Therefore, each person needs to cut..
 - a. 8 - 18" pieces
 - b. 6 - 12" pieces
3. You may use any of the methods shown to cut the pipe. Just make sure your cuts are accurate and consistent. The stands will not be square if the cuts are not made properly.

Sand It and Paint It

1. All the parts will be painted on this project. Remember, design is in the details. No one wants to purchase something made with marks all over it. Thin coats of paint!!! At least three of them for proper coverage.
2. Paint on plastic won't hold up very well if it is constantly getting hit by flying objects. Therefore, we are going to sand off the ink on the pipe.
3. Using fine grit sandpaper, wrap around pipe clasp in hand and sand until each piece is uniform and solid white in color.
4. Paint two crossbars blue
5. Paint two crossbars yellow
6. Paint two crossbars red
7. Paint golf balls if not colored. 3 of one color and 3 of another (or white),

Assembly

8. Remember to assemble the colored pieces in the proper position. **Top is red, middle is blue, and bottom is yellow.**
9. The ladder ball stand will be assembled in two parts as drawn in the diagram. The upright and the base will be completely glued separate units. Don't glue the upright into the base! This is for storage purposes. Attempt not to have excess glue running down pipe. Wipe off any excess glue with a damp towel.
10. Glue all connection on the upright together until unit is finished as shown in the diagram.
11. Note: Be sure to glue while lying pieces on a flat surface so all connections line up accurately.
12. Glue the sides of the upright first then add in the cross bars.
13. Glue base together as shown in the diagram.
14. Each Tee in the base will need to sit perpendicular to the elbows when assembled. This will ensure that the upright will stand vertically when assembled.

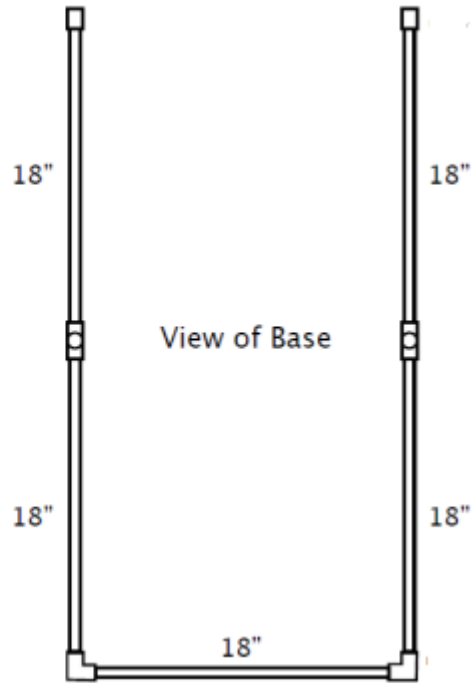
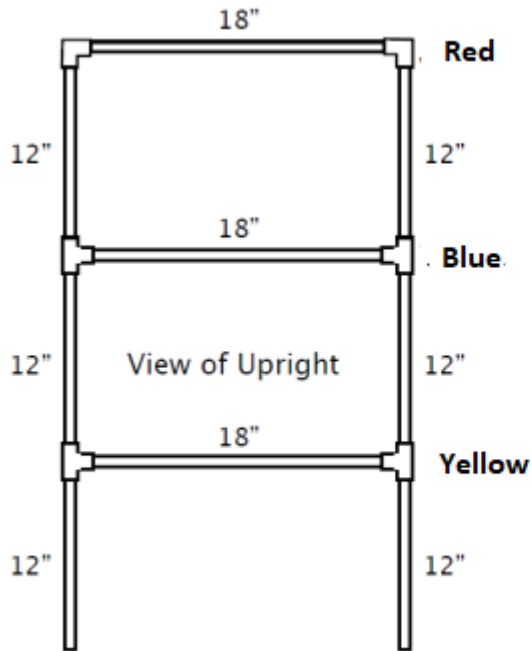
Make The Bolos

15. Now you need to make the bolos that will be used to play the game. Cut cord to 20" lengths with the NM Cable Cutters. Using the propane torch carefully melt the ends.
16. -Drill a 1/4" hole in each of the two golf balls using a drill press or drill.
17. -Run a piece of cord through each of the golf ball and tie a overhand knot at each end of the cord.
18. -Slide the golf balls to each end, tie another knot to trap the golf ball on the end, and you are finished.

Notes:

The top will fit into the base when assembled. Simply slide the 1/2" tubing into at the bottom of the upright into the slip-slip-slip (SxSxS) tee in the middle of the base. This will be the only connection that is not glued together.

Drawings/Photos:



Notes:

Ladder Ball Student Worksheet:

Name: _____
 Date: _____

Complete this worksheet prior to starting the project.

1. What size and thickness of PVC is used for this project?

2. What type of glue is used on the project? _____

3. How will you safely drill the golf balls?

4. What tools are required to complete this project?

5. DEFINE THE FOLLOWING:

a. PVC: _____

b. PSI: _____

Grading Rubric:

Criteria (+/- 1/2")	Possible	Score
Height and width	5	
Squareness and vertical stance	5	
Fittings glued properly, hold under tension	5	
General Workmanship (Clean use of glue, clean use of paint, and)	5	
Bolos	5	
Worksheet completion	5	
TOTAL	30	

Official Rules of Ladder Ball

Ladder ball, is played with 2-4 players, consisting of 2 teams. Each player has 3 golf ball bolas, which are 2 golf balls attached by a nylon rope. The color of the bolas is indicated by the player. The object of ladder ball is to toss the bolas in an underhanded fashion while trying to wrap the bolas around the steps of the lawn or ladder golf set. The lawn golf set consists of 3 steps or tiers: Top, middle, and bottom.

Playing Ladder Ball

Toss Line: The player must stand 15 feet away from the ladder ball stand

Rounds: Ladder ball is played in rounds, with each round consisting in tossing 3 bolas. A shootout is used to decide which player goes 1st over a 1 round scenario, with the winner achieving the highest score. The players proceed to toss the bolas in alternating fashion until the round is over. Bolas can be tossed in any underhanded fashion, as long as they are tossed individually and may be bounced off the ground. The winner of the round earns the 1st toss for the next round.

Ladder Ball Scoring:

All Games are played to an exact point total of 21!

In order to win, a player or team must achieve an exact total of 21 points before the other player or team after the round is completed. If both teams happen to tie at 21 points in the same round, a playoff tiebreak occurs and a win by 2 scenario is enabled. If a player goes over 21, that player or team's score goes back to 13.

After all teams have tossed their bolas, the score is determined by the amount of bolas hanging from the rungs. Players can knock off other bolas or place their bolas on the same rung to cancel out the opponents score. Only bolas that are left hanging on the rungs, without the existence of your competitor's bola, are counted as points.

Ladder Ball Points

Points are determined by which rung your bolas land on. The top rung is worth 3 points, middle rung is 2 points, and bottom rung is worth 1 point. Players can score additional bonus points by landing all 3 bolas on the same rung or on each rung (1-2-3). The highest possible score in a single round is 10.

-Hat Trick: A hat trick occurs when the player lands all three bolas on a single rung without any of your opponent's bolas on the same rung. When a hat trick occurs, an additional point is given. For example, a player lands all three of the bolas on the bottom rung. That is 3 points total, also earning the bonus 1 point for 4 total points in the round.

****Example:** If you toss 3 of your bolas on the top rung, yet your opponent tosses 1 of their bolas on the top rung, you only get credit for 6 points. But, if you land all 3 bolas on the top rung without your opponent's bolas on the top rung, you receive 9 points, plus 1 bonus point for a total of 10. Ladder Ball

Teacher Notes:

- Student can each build one ladder (1/2 set) or work in a team to build a complete set.
- With a bit of ingenuity the ladder assembly could be pressure tested in a water trough. Use two PVC Compression Male Adapters. Cap one and connect the other to a regulated (10 psi) air source. Caution: Excessive pressure will blow off the fitting!
- Consider having a tournament when the project is complete.



Agriculture Standards Met:

- 4.0 Technology. Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments:
- 4.6 Differentiate among, select, and apply appropriate tools and technology.
- 5.0 Problem Solving and Critical Thinking. Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques:
- 5.1 Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
- 5.3 Use critical thinking skills to make informed decisions and solve problems.
- 6.0 Health and Safety. Students understand health and safety policies, procedures, regulations, and practices, including the use of equipment and handling of hazardous materials:
- 6.1 Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.
- 6.2 Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies.
- 6.4 Maintain safe and healthful working conditions.
- 6.5 Use tools and machines safely and appropriately.
- 6.6 Know how to both prevent and respond to accidents in the agricultural industry.
- 7.0 Responsibility and Flexibility: Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings:
- 7.6 Know how to apply high-quality craftsmanship to a product or presentation and continually refine and perfect it.
- B1.0 Students understand personal and group safety:
- B1.1 Practice the rules for personal and group safety while working in an agricultural mechanics environment.
- B1.2 Know the relationship between accepted shop management procedures and a safe working environment.
- B1.3 Know how to safely secure loads on a variety of vehicles.
- B4.0 Students understand plumbing system practices commonly used in agriculture:
- B4.1 Know basic plumbing fitting skills with a variety of materials, such as copper, PVC (polyvinyl chloride), steel, polyethylene, and ABS (acrylonitrile butadiene styrene).
- B4.3 Know how various plumbing and irrigation systems are used in agriculture.

B4.4 Complete a plumbing project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, joining, and testing.

Objectives:

By successfully completing this project students will be able to:

- Read a plan to obtain critical dimension
- Identify by name common pipe and fitting types
- Properly cut PVC Pipe.
- Properly glue PVC pipe.
- How to properly apply spray paint.
- Assemble PVC Pipe

Alternate Tools/Methods/Materials:

- ½" pipe can be used. Class 200 pipe from an irrigation supply is usually cheaper than Schedule 40.
- Tip: Slot the legs with a hacksaw where they go into the base. They will be easier to remove
- Cheap colored golf balls! Used Golf balls work as well. Multiple colors saves painting.
- The cross-bar, caps, and elbows in the base can be omitted (see photo). The base then becomes two pieces.

Safety Review:

- PCV Glue (Fumes and fire hazard)
- Spray Paint (Fumes and fire hazard)
- Propane Torch (used away from glue and paint)

Project Time:

Demonstration: 30 minutes

Build: 2 hours

Demonstration Notes:

1. Review the plan and show how the plan describes the project
2. Review the fittings and the type of pipe being used.
3. Demonstrate how to properly apply spray paint. Note: Have some pre-painted pieces for the demo. Plan on cutting/painting one period and assembly the next to allow the paint to dry.
4. Demonstrate the recommended method of assembling the project flat. Use a table big enough to hold the project.
 - a. Assemble cross bars to **one** fitting. Glue both parts, ¼ turn and hold as the glue sets.
 - b. Glue the second fitting to the crossbar at 90° then quickly rotate and press flat on the table. REMEMBER to match colors.
 - c. Glue the uprights to the cross bars. REMEMBER colors in the proper order.
 - d. Note: The base is more complicated as the tees need to be glued 90° to the elbows. Start with the end and two ells as these are flat. Add the tees using a scrap of pipe in the tee to help rotate vertically.
5. Stress the importance of seating the fittings so all the pieces fit.



6. Tip: If colors are messed up. Mask with masking tape and paint in place.
7. Review the process of cutting and fitting:
8. Assembled project should lay flat.
9. Demonstrate drilling the golf balls. A drill press is best. You can make a simple jig to hold the golf ball snug and centered in the drill press table.

Bill of Materials

(Excel, update with local prices)

Projects:

24

Size	Desc	Units	Qty/Project	Cost/Unit	Order	Amount
3/4"	PVC Pipe Class 200 or Sch 40	20'	2	\$ 3.00	48	\$ 144.00
3/4"	SS 90 degree, PVC elbow	20 pak	0.04	\$ 2.50	1	\$ 2.50
3/4"	SSS Tee, PVC	20 pak	0.6	\$ 2.50	15	\$ 37.50
1/2 pint	Fast Set PVC Glue (clear)	each	0.08	\$ 4.00	2	\$ 8.00
3/4"	PVC S Cap	10 pak	0.4	\$ 8.00	10	\$ 80.00
	Spray Paint Various colors	can	0.5	\$ 4.00	12	\$ 48.00
1/8"	1/8" cord	100'	0.1	\$ 5.00	3	\$ 15.00
	Golf balls	dozen	0.5	\$ 10.00	12	\$ 120.00
					TOTAL	\$ 272.00

Plan by: Joey Silva edits M. Spiess