

The Poison Dart Frog Game

For 2-4 players, ages 8 to 12. Allow 40-45 minutes to play, with the first 15 minutes being used for explaining how to play. Length of play is affected by how many tadpoles you choose to use. (Students younger than 8 may simply enjoy playing with the tree, not a formal game.)

Background information:

(Players should know this information before starting to play the game.)

Poison dart frogs live in the rainforests of Central and South America. They were named after a hunting method used by natives of the Amazon forest. Some tribal hunters would rub the tip of their arrows (or “darts”) on the skin of these frogs, knowing that the skin contained a poison. This poisonous chemical, called “curare,” (*cure-AR-ee*), also occurs in some plants of the Amazon. The poison works by interfering with the transfer of electrical signals in the nervous system. There are little gates all along our nerve cells that must constantly open and shut in order to work properly. Curare causes these gates to get stuck in the open position. The nerves cannot send signals, and without signals, all muscles, including the heart, stop working.

The frogs don’t actually make the poison themselves. The chemicals that make the poison (alkaloids) come from the insects that the frogs eat, mainly ants and termites. The chemicals go out of the digestive system into the blood vessels, then into the skin. When dart frogs are kept as pets they are fed special frog food that meets all their nutritional needs but does not contain alkaloids, so they do not become poisonous.

Animals that are poisonous are often brightly colored, perhaps as a warning sign. All predators in the rainforest avoid these frogs except for one species of snake which seems to be unaffected by the poison. Unfortunately this snake doesn’t seem to have a common name and is known only by its scientific name, *Erythrolamprus epinephelus*.

Dart frogs range from the forest floor up into the canopy layer. They climb trees using tiny suction cups on the tips of their toes. They do not have webbing between their toes like most frogs do. When it is time to lay eggs, the female frog will go down to the forest floor and find a moist area under a leaf or near a puddle. Most frogs lay hundreds of eggs, but dart frogs lay at most a dozen. The male frog stays near the eggs and makes sure they don’t dry out. When the eggs hatch into tadpoles after several weeks, the father frog takes the tadpoles one at a time up to the canopy layer and finds a puddle of water between the leaves of a bromeliad plant. The tadpoles stick to the father frog’s back because it has a layer of sticky mucus. One by one, the father frogs puts the tadpoles into the puddle. The mother frogs often stays near the tadpoles as they grow, and will even lay unfertilized eggs in the puddle for the babies to eat. This is how the baby frogs obtain poison until they are old enough to eat ant and termites. While living in the plant puddle the tadpoles also feed on larva and small invertebrate animals that live in the puddle all the time. The plant puddle is actually a tiny ecosystem all of its own! The baby frogs grow up and then the cycle starts all over again.

Goal of the game: to successfully put one or more tadpoles into the bromeliad so it can grow up to be an adult frog.

In this game you will simulate the life cycle of a dart frog. Your frog must first eat some ants in order to build up the poison in its skin. Before it eats ants, it will be vulnerable to being eaten by predators. The predators in this game are the tarantula, a bird called “Cock of the rock,” the mussurana snake and the *Erythrolamprus epinephelus* snake. After your frog eats some ants it will not be eaten by the tarantula, the bird or the mussurana, but it can still be eaten by the *Erythrolamprus* (*ee-RITH-ro-LAMP-rus*). Your frog will then lay eggs under a leaf on the forest floor. After the eggs are laid, the frog will then carry the tadpoles to the top of the tree and place them in a bromeliad plant. In some species of dart frogs, it is the male who carries the tadpoles up the tree. Your frog can play both the male and female roles in this game. The game ends here, with the tadpoles safely in the puddle in the plant. In real life, of course, the tadpoles spend several months maturing into an adult frog, but this part of the life cycle is harder to make into a game.



You will need:

- Copies of the following pattern pages printed onto card stock paper
- Scissors, masking tape and glue sticks (I recommend glue sticks made for adults, not “school glue.”)
- A “trifold” presentation panel made of corrugated cardboard (available at craft stores and places like WalMart)
- An X-Acto knife for cutting the cardboard
- Green card stock, or green paper (minimum 3 sheets per tree)
- Brown spray paint and/or brown acrylic paint (although the game will still work if you don’t paint the tree)
- Optional: artificial leaves to glue onto forest floor sections (and maybe glue gun to tack them down)

How to make the tree:

If you are able to access video, I have a 10-minute demo video showing how to make the tree. It is posted on the description page for this game, but can also be accessed by going to YouTube and searching for “How to assemble tree for dart frog game.”

If you are not able to access the video, here are pictures from it:



This is how you will cut your pieces out of the trifold cardboard. The centers of the trunks will be on the fold lines.



Use an X-Acto knife to cut out the two trunk pieces. Top of trunk is about 8” (20 cm) wide. Base is about double that.



Cutting out second trunk. The “scrap” in the middle will be cut into your base.



Cut your square base from that middle piece.



Cut slots up the side of each trunk. The slots should be as wide as the cardboard is thick, and about 4 cm long.



Cut one of your long scraps in half.



Cut that long scrap into rectangles that will be your ledges.



Cut slots into the ledge pieces (like you did on the trunks) then insert ledges into slots on sides of trunks.



Cut two half-circles, cut slots into them, then make a slot in the trunk near the top and insert the half circle into it.



Assembly and painting of the tree:

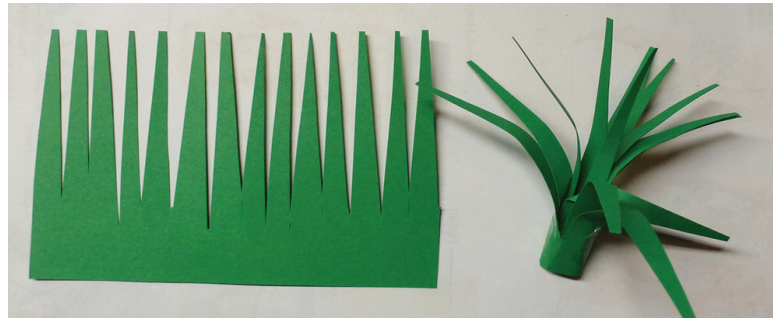
The assembly of the tree will depend on what you want to do with it after you are done using it. In my case, I anticipated using it again in the future, so I wanted to be able to carefully disassemble it and store it flat. If you want to make it extremely sturdy and not disassemble it, you may want to use some hot glue as well as clear tape or masking tape. I used masking tape, just enough to keep the trunk halves together and stuck to the base, then painted over it with brown spray paint.

After I had the tree assembled, I used brown spray paint with a flat finish. I try to avoid spray paint in general, as I don't like polluting the environment, but in this case, I simply did not have the time to hand paint all the trees. I used brown acrylic (non-spray) paint to touch up various places afterward, though. If you can't take the tree outside to spray, and you have enough time, you can brush on brown acrylic and not spray at all.

Green paper epiphytes:

Tropical trees almost always have epiphyte plants growing on their trunks and branches. These don't hurt the tree at all, and provide homes and breeding grounds for many species of insects and small animals such as dart frogs.

Cut pieces of green paper as shown below and then roll them up and secure with tape or glue. Then glue or tape them onto the sides of the trunks at various places.

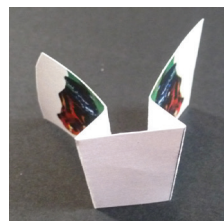


You will need bromeliad epiphytes at the top, one per quadrant (4 total). Make these in a similar fashion to the other epiphytes, but do not roll them tightly. Leave an open circle in the middle where the players can put tadpoles, as shown in the picture here on the left.

How to assemble frogs and predators:

Cut out each frog unit, but don't worry about an exact cut on the top. (You will trim it after gluing.) Bend on fold lines so it looks like the sample in the photo (left). Bottom view is shown. (Make accurate folds!) Use glue stick to glue halves together. Then trim along top, cutting frogs to exact shape.

Use the same technique for predators.



How to set up the game:

- 1) Each player has a dart frog, an egg card, 1 to 3 tadpole cards, and an ant card.
 - 2) Put the ant card on the forest floor, and keep the others in front of you, but not near the tree. Put the frog on the top ledge where the bromeliad is.
 - 3) Put a predator in each of the four forest floor quadrants. The predator can be on or off the cardboard base, which ever works better for you. (You can use a die to help decide where to put the predators if players can't agree.)
 - 4) The spinner can stay in one location or it can move around. Players will take turns spinning, but the spin will be for everyone. After the spinner comes to rest, players look to see which number they got and they may move their frog that many times.
 - 5) Choose how long you want the game to go by choosing the number of tadpoles you will use.
- Approximate guideline: One tadpole = 15 minutes, two = 15-20 minutes, three = 20-25 minutes, four = 30-35 minutes

Rules for moving the frogs: (Video available on youtube, search for "how to play the poison dart frog game")

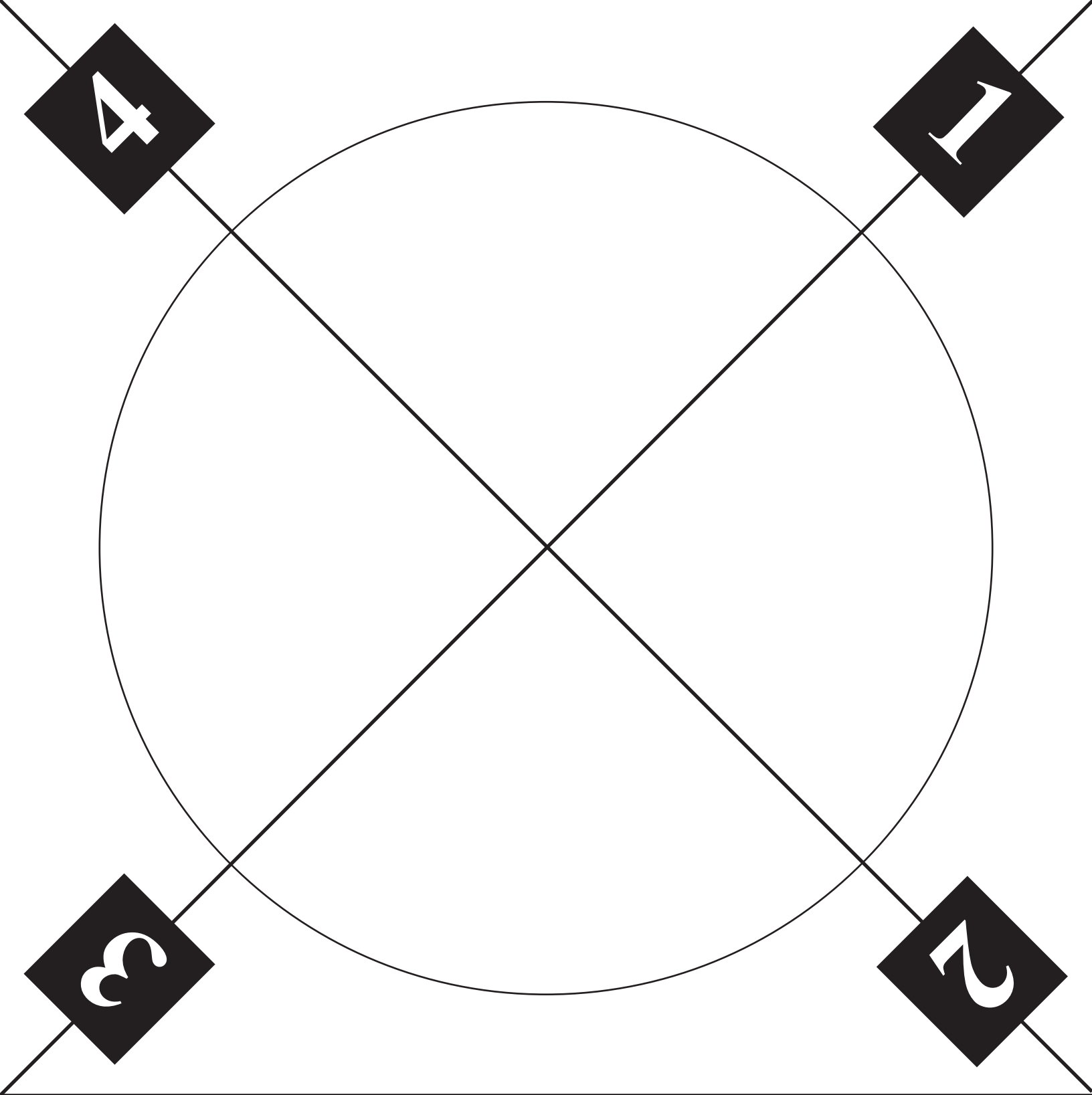
- 1) Players may hop their frog from one shelf to another, up or down, but never across. They may only cross to the other side after touching down on the forest floor or on the top shelf where the bromeliad is. Imagine your corner of tree to be a clock face with two straight sides. You can only go clockwise or counterclockwise on one turn.
- 2) Players must use all their hops. For example, if you spin a 3, you must make 3 hops.
- 3) If moving all your hops will end your turn with your frog on the forest floor where a predator will get it, you may decide to skip your turn and just stay where you are. (The next spin might bring something better.) Remember, "passing" on your turn is always an option.

Rules for moving the predators:

- 1) The predators will move clockwise around the base of the tree at the end of each turn. So after four turns, they will be back around to where they started. They keep moving all during the game. You must watch out not only for the predator who is currently at the base of your section of tree, but also the predator who will be coming next, at the end of the turn. Don't get caught on the forest floor when the brown snake comes along!

Tasks the frogs must do:

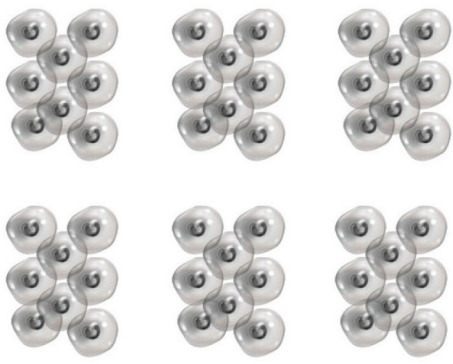
- 1) The first thing you must do is become poisonous. You do this by eating ants. (The alkaloid chemicals in the ants will go into the frog's skin.) Since you are not poisonous yet, it will be dangerous to spend any time at all on the forest floor. To pick up the ants, you must grab them on a turn where you have enough hops to get back up the tree. In other words, if you are sitting on the ledge just above the floor, and you spin a 1, you can't go down to the forest floor because you only have one hop and will therefore be stuck on the floor. You must spin a 2 or higher so that you can take one hop down, grab the ants, then have hops left to get back up to a ledge.
- 2) After you have become poisonous, you will then be able to spend time on the forest floor while three of the predators are there: the bird, the tarantula and the black snake. The brown *Erythrolamprus* snake is immune to dart frog poison so you will have to be careful not to touch the forest floor at any time while that snake is below you. Be careful and watch out for predator rotation. If you are sitting on the forest floor when the predators are rotated and the brown snake gets moved onto your forest floor, it can get you! (If the snake gets you, just move your frog back up to the top ledge and start over. Don't stop playing, just start your frog over again.) Keep track of where that brown snake is!
- 3) After becoming poisonous your next task is to lay eggs on the forest floor. You will put your egg card under a leaf if you have leaves on your forest floor. You can do this on either a turn with an exact count to the floor (unless the brown snake is there, or will be there on the next turn!) or you can do it on a turn where you don't have an exact count to the floor, and simply pass by the floor on your way up the other side of the tree.
- 4) After you put your egg card down, you need to wait until they hatch. You simply "pass" on your next turn and don't move at all. Instead of moving, you will remove your egg card and put the tadpoles in its place. (You will have determined before you started how many tadpoles will be in this game. More tadpoles makes for a longer game.)
- 5) Now you need to go down and get each tadpole one at a time and give it a ride to the bromeliad plant at the top. (Since the tadpoles are hidden under a leaf the predators will not get them.)
- 6) You may pick up a tadpole without getting an exact count to the bottom. In other words, if you spin a 4, you may go "hop, hop," pick up a tadpole, "hop, hop."
- 7) Once you get to the top, put the tadpole into the bromeliad and finish your hops if you need to.
- 8) When the last tadpole is put into the bromeliad, your frog is done and has finished the game.
- 9) The game can be over as soon as one frog is one, or you can go on and let all frogs finish their tadpoles. Either way, everyone wins because we all had fun and learned a lot about dart frogs!

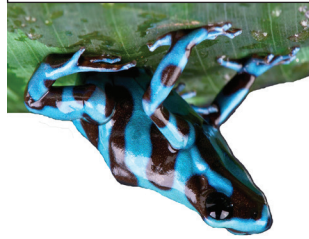


Make two copies of this page.

- 1) One of the copies will remain as a square. Don't cut out the circle.
- 2) On the second copy, you will cut out and keep the circle and discard the square outer rim.
- 3) Glue both the square and the circle to corrugated cardboard. (You can use the scraps left over from cutting your tree.)
- 4) Use something like a small screw or a pushpin, or even a short pencil, to put the circle spinner onto the square base. You want the circle to be able to spin very easily and quickly. Just fiddle with it a bit until it spins nicely.
- 5) Glue or tape pictures of the frogs you will be using in the game onto the circle, one per quadrant. If you are doubling up and putting more than one player on a quadrant, put both their frogs onto the same spinner quadrant.

















These extra frogs will be taped or glued onto your spinner.





Erythrolamprus epinephelus

(Sorry, there isn't a simple, common name. Just say "ee-RITH-ro-LAMP-rus.")

This snake is immune to the dart frog's poison.





The tarantula can be
harmd by the poison.



All photos used in this game are from
Wikipedia or various other Internet
sources and are being used as “fair use
for educational purposes.” No copyright
infringements are intended. (This game
will never to be sold for profit.)



“Cock of the rock” is a bird that
will eat small animals.
It can be harmed by the poison.





The mussurana snake can be by the dart frog's poison.

