



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title
From Physics to Fish: Using Archimedes Screw to Transfer Fish from One Water Basin to Another

Abstract

Objectives/Goals
The purpose of my experiment was to find out whether Archimedes' screw could or could not lift fish over a barrier safely. The fish ladder used in American rivers has many problems and I am trying to fix that using Archimedes' screw.

Methods/Materials
Methods: 1. Cut one 3 inch diameter hole in each plastic storage bin in the middle of the side-wall of the bin; 2. Place one of the two plastic bins on level ground; 3. Place the other of the two plastic bins elevated to attain an angle of 45 degrees; 4. Connect both of the plastic bins by securing the PVC pipe in the holes in each plastic bin; 5. Place the 3-inch by 24-inch metal auger into the 3 inch by 24 inch PVC cylinder; 6. Fill each plastic basin with room temperature water to about three quarters of the way up the bin; 7. Connect the auger to the power drill, then insert the auger into the PVC pipe making Archimedes' screw; 8. Place the small feeder guppies in the plastic bin that is not elevated; 9. Turn on the drill at low speed; 10. Begin to transfer fish in Bin I (Not Elevated) to Bin II (elevated).

Materials: 2 large plastic storage containers; Sealant; Room temperature water; Archimedes' Screw: PVC Cylinder 3 inches by 24 inches; Metal Auger 3 inches by 24 inches; Drill for rotation on the auger; Drill for cutting holes in plastic basins; Fish: Small feeder guppies; Notebook; Pencil; Protractor.

Results
In this experiment, when transferring fish using the Archimedes' screw, 73% survived. The number of fish in the first experiment that went through the screw intact was 19. Of that number 5 were dead, 14 were alive. In the second experiment 29 fish got through intact. Of that number 8 fish were dead and 21 were alive.

Conclusions/Discussion
In conclusion, the survival rate was always much greater than the death rate in all experiments. The fish that got through the screw were never cut up even when dead. The death rate was 27%. The survival rate was 73%. This survival rate compares favorably and is superior to the commonly used fish ladders. Something that could have changed the outcome of the experiment was the number of fish used, the temperature of the water, the size and type of the fish, and the size of Archimedes' screw.

Summary Statement
My project was to see if Archimedes' screw could transfer fish from one basin of water to another safely.

Help Received
My father helped me construct an Archimedes' screw and my teacher helped me format my report.