Aqualibrium water competition

RULES AND INSTRUCTIONS

Goal

The goal of the Aqualibrium Water Competition is to distribute a quantity of water equally between three points on a grid using a network of pipes. Teams are judged on how well they can achieve this task after a certain period of testing.

Rules

Network Setup

1. Place the competition sheet horizontally on a table or the ground.
2. Place the assembled stand, large reservoir and main supply assembly next to the competition sheet to connect at point 1.
3. The judges indicate three points on the grid where the small containers must be connected to the network. Any three of the 16 points may be selected.
4. Participants build a pipe network connecting to the main supply pipe at point 1 to the three small containers using the different diameter pipes. Pipes may only be placed on the grid lines of the competition sheet. Where two or more pipes meet at a junction they must all be connected to each other.
5. No more than a certain number of lines on the network grid may be without a pipe. The default value is 8, but a different value may be specified by the judges.
6. Dead end pipes are not allowed, i.e. all pipes must connect to one or more pipes, or to a small container.
7. Small containers have to be connected to the network using the container connectors.
8. Note that when a small container is placed at an internal point (i.e. points 6, 7, 8 or 9), it will not be possible to connect more than three pipes to that same point (since the container connector will always take up one of the connector outlets).
9. No modifications of any kind may be made to the network equipment.

Removal of air from the system

10. To remove the air from the system, pour water into the source container, open the valve and allow the system to run. Flick or gently lift pipes to help remove any large air bubbles stuck in the system if necessary. Once the air is sufficiently removed, close the valve.
11. Empty the small containers.
12. The system is now ready to run - the small containers are empty, but the pipe network is filled with water.

Practice runs

13. Participants are given a certain time as determined by the judges (typically one hour) to build, test and improve their networks.

Final run

14. Once the final network has been built and the air removed from the pipes, fill the source container with water. The source container should never be filled above the maximum level indicated (5 L).
15. Inform a judge that you are ready to do the final run. Once the judge gives the go-ahead, the valve is opened fully and the network allowed to run.
16. Nobody is allowed to interfere with the network for the duration of the run.
17. When the fastest filling small container's water level reaches the green mark on the level indicator, the valve is closed to stop further flow.
18. Remove the U-connectors from the tanks to ensure that back siphoning of the water does not occur.
19. If the water level in the fullest container is not within the green mark on the level indicator, the run is disqualified.
20. The penalty point score of any container with a water level that is within the green mark on the level indicator is recorded as zero. The penalty point scores of other containers are read from their water level indicators.
21. The small container penalty point scores are added to obtain the system penalty point score.
22. The group with the lowest system penalty point score wins the competition.

Disassembly and storage

23. Once the competition is finished, disassemble the set and return to its container.
24. Check that all components have been returned to the container.
25. It is important to leave the set open until all the components have dried out fully before closing the lid and storing the set in a safe place where it cannot be accessed by small children.

Judge's decision is final

Networks not fully complying with the competition rules are disqualified. The judge's interpretation of the rules and decisions on the winning network, disqualifications and disputes will be final.

Alternative way to measure penalty points

An electronic scale may be used to measure penalty points more accurately as described below. Either method may be used, as long as the same method is used for all groups taking part in a competition.

The fullest container (which must have its water level within the green mark on the level indicator) is the reference volume and automatically has a penalty point score of zero. The penalty points of each of the other two containers is determined as the difference between the volume in the fullest container and their volumes, measured in millilitres. An electronic scale may be used to measure the volumes accurately, noting that the mass of 1 ml = 1 g. Negative differences should be converted to positive values. The total number of penalty points is determined by adding the penalty points of all the small containers.

Example: Say small container 1 filled up first and has a measured volume of 1 015 ml, and small containers 2 and 3 have volumes of 940 and 825 ml respectively. The penalty points for container 1

is zero, container 2 is 75 (1015 – 940) and container 3 is 190 (1015 - 825). The system's penalty point score is then calculated 265 (0 + 75 + 190).