Appendix D

## OB-SCERTAINER ACTIVITY

This activity will required the student to discover the maze pattern inside the Ob-Scertainer with opening it. They gently tilted and rotated the Ob-Scertainer to hear the small steel marble move around the partition pattern. There were twelve different barrier configurations..

Figure D1 - Obscertainer

**Supplier of Ob-Scertainer:**

**Lab-Aids Incorporated**

**Ob-Scertainer – A Better Black Box**

**Kit #100**

**17 Colt Court**

**Ronkokoma, NY 11779**

**XANADU BEHAVIORAL SCIENCES**

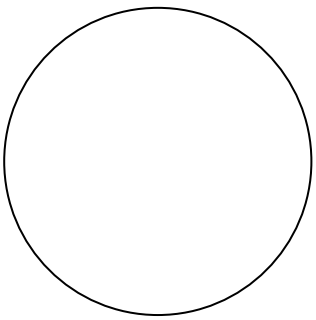
**Dear scientists,**

**We are asking for your behavioral experts to evaluate our research process. To understand the procedure our subjects are undergoing we have supplied your group with the Obscertainers with hidden internal maze patterns. Please attempt to discover the barrier pattern without any additional information. After a time, the lead scientist will provide 12 possible patterns and we ask that you modify and redraw your pattern. Finally the investigator will provide the pattern for each numbered Obscertainer. Please remember that all experimentation is done without actual visualization of the inside of the Obscertainer.**

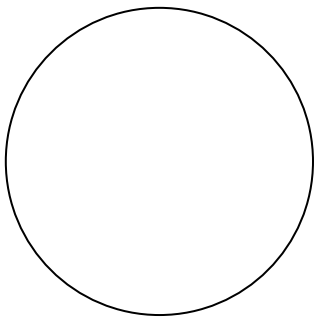
**Thank you for your evaluation and expertise.**

**XBS**

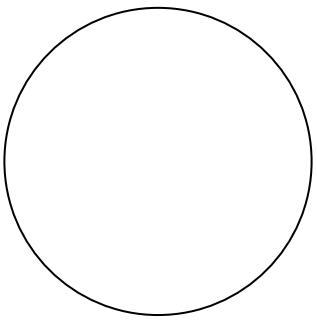
**Obscertainer Number _____**



**Hypothesis**



**Modification**



**Exact**

# XANADU ROCK (1)

The United States has finally obtained a piece of material from the planet Xanadu. Scientists have had the opportunity to discover several pieces of information. Your mission is to discover the information missing and to design an experiment to test your data.

**Known Information:**

Color: Black

Density: 0.971 g/cm$^3$

Additional Materials:

Ruler

**Equipment:**

The science lab has the following equipment available to test and confirm your obtained data:

graduated cylinder

balance

ruler

water

vegetable oil

pan

1000 mL beaker

# XANADU ROCK (2)

The United States has finally obtained a piece of material from the planet Xanadu. Scientists have had the opportunity to discover several pieces of information. Your mission is to discover the information missing and to design an experiment to test your data.

**Known Information:**

Color: White

Additional Materials:

Ruler

Balance

**Equipment:**

The science lab has the following equipment available to test and confirm your obtained data:

graduated cylinder

balance

ruler

water

vegetable oil

pan

1000 mL beaker

# XANADU ROCK (3)

The United States has finally obtained a piece of material from the planet Xanadu. Scientists have had the opportunity to discover several pieces of information. Your mission is to discover the information missing and to design an experiment to test your data.

**Known Information:**

Color: Beige

Density: 1.20 $g/cm^3$

Additional Materials:

Balance

**Equipment:**

The science lab has the following equipment available to test and confirm your obtained data:

graduated cylinder

balance

ruler

water

vegetable oil

pan

1000 mL beaker

# XANADU MATERIALS LABORATORY

Dear Distinguished Colleagues,

Again, Xanadu finds itself in a dilemma. The scientists have been able to identify four substances, each in the amount of five grams, in the enclosed mixture: iron filings, zinc metal, salt, and sand. Your help is requested to discover a procedure to isolate each of the substances and in turn determine how efficiently they can be separated. Please find below a list of equipment that Xanadu has at their disposal to use for the separation.

Thank you in advance for your cooperation.

Scientists

Xanadu Materials Laboratory

Available Equipment

Balance

Water

Large Mess Screen

Filter Paper

Funnel

Watch Glass

Hot Plate

Stirring Rod

Magnet

Beakers

## XANADU SUBSTANCE IDENTIFICATION UNIT

Dear esteemed colleague,

We are in desperate need of your assistance. Our laboratory has flooded and the labels from eleven substances have come off of the container. We do have the labels so we know which eleven we have but have not been able to be more specific. We have listed how most of these chemicals react with specific indicators. Please determine a procedure for identifying these substances. Please be aware that there is a limited amount of each substance available.

Thank you for your continued assistance.
XSIU

**Substances**

Boric acid
Calcium carbonate
Calcium sulfate
Cornstarch
Levulose
Magnesium sulfate
Sodium bicarbonate
Sodium carbonate
Sodium chloride
Sodium hydroxide
Sucrose

**Test Reagents**

Iodine
Vinegar
Phenophthalein solution
Sodium hydroxide solution
Benedict's qualitative solution
Isopropyl alcohol solution
Water

**Known Chemical Reactions**

1. Cornstarch, calcium sulfate, and calcium carbonate will not dissolve in water.
2. Iodine tincture will turn cornstarch a deep blue color while calcium sulfate and calcium carbonate will turn orange-brown.
3. Vinegar will cause carbon dioxide gas to be released from calcium carbonate.
4. Sodium hydroxide solution and sodium carbonate solution will turn pink in the presence of phenophthalein.
5. Vinegar will cause carbon dioxide to be released from sodium carbonate.
6. Sodium hydroxide will cause a white precipitate to form when added to magnesium sulfate solution.
7. Benedict's solution will cause an orange precipitate to form when heated in the presence of levulose.
8. Vinegar will cause gas bubbles in solid sodium bicarbonate.
9. Boric acid will dissolve in isopropyl alcohol.
10. Sucrose will melt when the solid is held over heat.